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A POPULAR TREATISE

ON THE

CAUSES AND PREVENTION

OF

DISEASES.

BY

SAMUEL FENWICK, M.D.,

LECTURER ON PATHOLOGICAL ANATOMY AT THE NEWCASTLE COLLEGE OF MEDICINE
(IN CONNECTION WITH THE UNIVERSITY OF DURHAM).

VOLUME I.

DISEASES OF THE THROAT AND LUNGS.

BIBLIOTHECA BODLEIANA

LONDON:
JOHN CHURCHILL, NEW BURLINGTON STREET.
MDCCCLVII.

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152. -. 1.

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To

THE VENERABLE CHARLES THORP, D.D., F.R.S.,

The Warden of the University of Durham,

This Volume

IS (BY PERMISSION) INSCRIBED

By

His obedient Servant,

THE AUTHOR.

PREFACE.

The amount of public attention which is now bestowed on all matters of science is one of the most striking characteristics of the age. Popular works are continually issuing from the press, and the latest discoveries in chemistry, geology, and other branches of science are largely read and discussed: nor is there any lack of interest respecting medicine, for popular works upon this subject are as numerous as can be desired. Books on domestic medicine and medical dictionaries crowd the shelves of every bookseller, and not a year passes over without adding to the stock of systems of medical treatment. At one time the public belief is solicited for the unfailing virtues of cold water, at another every one is entreated to swallow the theories and the globules of Hahnemann; whilst the pages of each newspaper teem with advertisements of pills, drops, and lozenges for every disease with which humanity is afflicted. But the greater part of our popular medical literature seems to me to be based on a wrong principle, and consequently of little or no value. The general aim appears to be to teach persons unacquainted with medical science how to ascertain the existence of disease, and to remove such complaints as they may believe to be present. Now with respect to the first of these, no *description* can enable one unaccustomed to observation to discriminate between the slight differences in symptoms that occur in the progress of complaints, or to estimate the dependence of one symptom upon another. A well-educated physician chiefly judges, not by the sensations of his patient, but by the use of his own sight, hearing, and touch. Chemistry, the microscope, the stethoscope, and numerous other scientific appliances often enable him to ascertain a disease when no symptom exists to indicate its presence. Besides, however skilful a person may be in the detection of disease, it seldom happens that his ability can be usefully exercised upon himself; his judgment is apt to be warped by his feelings, and that knowledge of the usual results of the derangements under which he may suffer, which is so valuable in the treatment of others, is liable to blind him to symptoms of the utmost significance in himself.

If it be difficult for persons unaccustomed to medical practice even to ascertain the existence of disorders, how much more hopeless is the attempt to teach in a single volume the treatment of disease.

Many of the works on this subject are ridiculous, and a still greater number are dangerous. I will pass over the time-honoured pages of Buchan and the absurdities of Reece, and give the following extract from a popular work on medicine, just published: Apoplexy.—" Take blood from the arm, whether the pulse be full or not; place a scruple of calomel on the tongue; give repeated doses of black draught at intervals of three or four hours, if the patient can swallow, so as to purge the bowels briskly; shave the head and apply cold water; and put mustard-poultices on the feet and calves of the legs. Permanent paralysis is a frequent consequence."

Now, let my readers imagine a person armed with such instructions attacking the first case which he may suppose to be apoplexy; perhaps bleeding and mercurializing an unfortunate whose complaint arises from starvation or an overwrought brain. Any chance of recovery would be certainly destroyed, and the lancet would effect what the disease might be unable to accomplish.

But if medical science cannot be usefully employed by the public for the detection or the treatment of disease, is there then no practical advantage to be gained by its more general study? Is medicine to be the only science that must be monopolised by its professors and denied to the public at large? Most assuredly not, for no knowledge admits of more general usefulness; and I object not to the public study of the healing art, but to its misapplication. An incalculable amount of suffering and of death might be saved if there existed a more general acquaintance with the nature of diseases and the methods of preventing them. It is impossible in a preface to notice all the advantages which would accrue from the public study of this subject, but perhaps a few hints may be useful.

A knowledge of the laws of epidemics would tend greatly to prevent their ravages and to save the lives of thousands who are now sacrificed at the shrine of ignorance and prejudice. An increased attention to sanitary matters would restrain their violence as effectually as the destruction of London by fire in former times rolled back the much-dreaded plague to the over-crowded and filthy cities of the East. It is true that the Legislature has granted extensive powers for the removal of the causes of diseases from our towns; but of what avail is this so long as those entrusted with the execution of these acts remain blind to their necessity, or ignorant of the first principles of science?

A large number of persons are exposed to epidemics, to whom a knowledge of their causes and prevention would be peculiarly useful. How many tales of suffering on board emigrant-vessels might have been thus avoided. How many calamities have happened in newly formed colonies, which have resulted entirely from ignorance, and which might have been averted by a very slight acquaintance with medical science.

The manufacturing industry of this country is a never-failing theme for the orator and statesman, but there are few who are aware of the price we pay for our national greatness. Almost every trade that can be named affects in some degree the health of those employed in it. Thus needle-grinders, iron-turners, potters, and millers are subject to a fatal form of bronchitis. Painters and workers in lead suffer severely from affections of the bowels. Those who use mercury feel its effects upon the nervous system. Lucifer-match makers often lose the jaw-bone. Bootmakers are the victims of indigestion; and tailors seldom escape disorders in the bowels. Great as is the sum of individual misery thus produced, still greater evils are to be found in the poverty and intemperance which are the usual accompaniments of years of protracted suffering, and in the neglect of the education of the children of those who are thus sacrificed.

In most trades the methods necessary to ensure the prevention of the diseases affecting operatives are so simple, that after being pointed out it seems wonderful that they had not been always in use. Thus the simple machine, described in a future part of this volume, is said to have rendered the shop of the steel-grinder as free from dust as a drawing-room; and yet it is also stated that for want of such precautions—

"Out of 2500 grinders there were not 35 who had arrived at the age of fifty, and perhaps not double that number who had reached the age of forty-five; and out of 80 fork-grinders, exclusive of boys, it was reported that there was not a single individual thirty-six years old."

A still more remarkable illustration is to be found in the fact that many of the compositors in the printing-offices of London suffered from a very serious disease of the eye, occasioned by the flickering of the gas; but where this was prevented by the use of a glass shade, as in the printing-office of the 'Times' newspaper, no symptoms of the complaint were experienced. Thus, for want of this simple remedy, a large number of the most intelligent class of operatives were plunged into indigence and its attendant evils.

It is well known that many diseases are transmitted from the parents to the children, and that some of these are amongst the most fatal and distressing disorders to which man is subject. We see whole families mown down in succession by consumption, or becoming one by one the inmates of a lunatic asylum, without any effort being made to ward off the complaint from those of the family who are still unaffected. The first symptoms are perhaps eagerly watched, but it often happens that before their appearance the complaint has made considerable progress. In such cases a knowledge of the *causes* which tend to awaken the dormant predisposition would be indeed invaluable, and if parents would acquaint themselves with the circumstances which tend to prevent the malady to which their children may be peculiarly liable the lives of numbers would be saved.

When a person has once suffered from any disorder, he is in general more liable to a return of it; and although this fact is well known, how seldom do we find any means of prevention employed. After the attack has been subdued the physician's advice is seldom asked as to the best mode of preventing a recurrence of it, and, if asked, his directions are still more rarely followed; either because the patient is unable to comprehend the reasoning on which they are based, or because his memory does not retain them. But if the medical practitioner could place in his patient's hands a short account of the nature of his malady and its causes, he would discern the reason of the cautions presented and of the rules laid down for his guidance.

The history of the past is full of hope for the future; as civilisation has progressed disease has lessened, and the value of life is probably now greater than at any former period. Leprosy and a number of the diseases of the skin have disappeared, since the introduction of modern improvements in clothing; ague is now never seen in districts in which formerly no person escaped its attacks. Smallpox has been robbed of its terrors by the use of vaccination. Consumption and scrofula have diminished, and many of most painful diseases to which man is liable have wonderfully decreased since the adoption of more temperate habits amongst our population. When a knowledge of the nature of diseases shall be more generally disseminated, and the circumstances tending to produce them more clearly known, they will be found still further to diminish, and the health, happiness, and morality of the community will be increased.

North Shields;
March 2*d*, 1857.

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ON CONSUMPTION AND SCROFULA.

ON

CONSUMPTION AND SCROFULA.

CHAPTER I.

THERE is no disease that has attracted so much attention as consumption. From the earliest ages of which we have authentic records, the symptoms of this destructive malady have been remarked, and the causes producing it have been discussed. Nor is this to be wondered at, for the characteristics of the disease are so striking, that they could not fail to arrest attention. The peculiar look, the gradual wasting of the strength and flesh, the hopefulness of the patient, all tend to impress the mind of the most casual observer. It is, however, a melancholy fact that, notwithstanding all the study bestowed upon it for so many ages, consumption still sweeps off a greater portion of the human race than any other disease. It is confined neither to climate nor to race, and the inhabitants of the warmest, as well as of the coldest regions, fall victims to its ravages. Nor is man the only sufferer, for it is one of the chief causes of death among many of the inferior animals. Monkeys, it is well known, usually die of it, when brought into this climate; and even the lion, tiger, and other beasts of prey, when confined in the cages of the menagerie, often waste away with all the symptoms of this disease. Insects and plants occasionally exhibit changes in their structure, which, by many pathologists, are considered as similar to those that in the higher classes of the creation constitute scrofula, which, as will be shortly explained, is of the same nature as consumption.

When we find a disease thus prevalent in all parts of the animal world, we naturally desire accurate information as to its effects on the human race. Every one has known some friend or relation removed by this complaint, but there are few who will not be startled by the announcement, that one fifth of the population of our country is swept off by its means. In London, in 1851, one seventh part of the whole number of deaths took place from consumption alone; and taking into account other diseases of a scrofulous nature, one fifth died of these maladies.

Most of those who have investigated these complaints have arrived at these conclusions, viz.,—that scrofula, consumption, and some other diseases of an equally fatal character, arise from the same causes and are of the same nature; and that all of these complaints may, in the majority of cases, be prevented by a steady perseverance in a proper course of treatment. But if diseases which destroy so large a portion of mankind are so difficult of cure when once established, and are yet capable of prevention, how necessary is it that their nature, and the means of avoiding them, should be understood by the public at large.

Science teaches us that some individuals are more liable to them than others, and it is to these, who will be afterwards pointed out, that such information is especially useful.

The chief and most general mistake respecting consumption is, that it is a disease only of the lungs. Persons frequently consult their medical advisers to know whether their lungs are affected, and if the answer is in the negative, they too generally consider themselves safe, and despise all precautions. Others, again, when informed that their lungs have already suffered from the disease, abandon all hope of recovery, believing that the difficulty of curing consumption arises from the impossibility of a lung regaining its healthy condition.

It is not surprising that such erroneous ideas should be generally diffused, since it is only of late years that the medical profession has arrived at more just views of the nature of this disease. It is now the general opinion of scientific men, that consumption, in the first instance, depends upon a diseased condition of the blood, and that, although most of the symptoms which characterise it arise from the affection of the lungs, the difficulty of removing it is connected, in most cases, with our inability to restore a healthy condition of the system at large. They also believe, that a vast number of other maladies, such as the greater part of the dangerous diseases of the joints and bones, and most of the cases of the complaint known by the name of "water on the brain," are also caused by a similarly diseased state of the constitution.

The reader will be naturally anxious to learn in what this condition of the system consists, which produces effects so deadly. In order to understand it, he must first be made acquainted with the properties and constitution of the blood when in a state of health.

The blood, which, in the Mosaic writings, is described as the life, performs several most important offices in the animal economy. It affords the means whereby every part of the body is able to renovate itself, and, at the same time, it sweeps away those portions of the system the continuance of which would prove fatal to existence.

Every one knows, from daily experience, that food is necessary for the support of life, but perhaps few understand the exact manner in which it sustains the body. In many instances we are but little aware of the beauty of the arrangements that exist even in the most common things around us; and this is the case with respect to food, which affords the material for that wonderful process of repair which is unceasingly going on in the animal frame.

That all created beings have a certain allotted period of existence is a truth that no one will deny; but many may perhaps be startled by being told that every particle of their bodies is continually hastening to decay, and will probably be replaced more than once during their present lifetime. Take, for instance, one of the hairs of the eyelash. If examined by the microscope when young, the hair will be found to be a tube with a number of particles at the root, which form its colouring matter and assist in its growth. But, as time goes on, these particles lose their vigour, shrivel up, and eventually the hair, having reached the limit of its existence, drops out and leaves its place for its successor. What is observable in this hair also takes place in every portion of the animal frame. Life and death, growth and decay, are continually going on in every tissue of which we are composed. The skin, which forms a covering to the body, throws off the dead particles from its surface; the muscles of the arm or leg lose a portion of their substance at each motion of their fibres; the brain, upon whose action depends not only our own, but the happiness of others, suffers decay, in all probability, in every exercise of its power; and even the bones, hard and firm as they appear, are subject to the same law. It is to supply new material for this continual waste that food is taken into the body; and, being digested in the stomach, is received into and becomes a portion of the blood, and passing into each structure affords the means of its renovation.

If the destruction of the different parts of the body is unceasing, so also is their renewal. Each particle, before disappearing, has its place supplied and its functions performed by its successor; and the blood, as it sweeps away the aged and worn-out portions, leaves in their room the materials for a new supply.

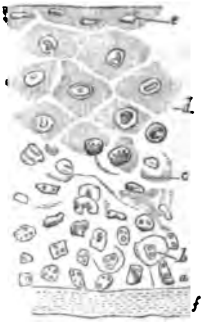
In order that the worn-out particles may be removed from the system, it is evident that they must be first reduced into a liquid form. This is effected by the air contained in the blood, which, by uniting with them, produces a species of slow combustion. Animal heat is caused by this process, and a number of substances are dissolved in the blood, which are afterwards expelled from the body by the lungs, kidneys, and skin.

It will be observed that derangements may occur either in the decay of the dying particles of the body; or in their expulsion; thus forming many of the diseases commonly met with. For instance, the disease known as diabetes consists in the formation of large quantities of sugar in the blood, and is probably occasioned by that substance being produced, instead of the other natural products of the decaying tissues.

On the other hand, the fatal effects of choking, hanging, or drowning, arise from the carbonic acid, resulting from the destruction of the tissues, not being discharged from the lungs. A person suffering from the gout is perhaps little aware that his pains are caused by an acid produced in like manner, and not removed from his blood by the kidneys.

Most of the tissues of the body appear, in the first instance, to be formed from minute particles, which are, technically, termed cells. In order to understand this, let my reader look at the annexed figure, which is a representation of a piece of the skin when magnified. It will be observed, that it consists of a number of small bodies of different shapes, the lower being round, the upper flattened. Let us trace the growth of these particles, so that we may comprehend the formation of the different structures of the body. The blood, when first it issued from its vessels to supply the necessary nourishment to this piece of skin, was, of course, in a fluid state. Part of it became solid, and the remainder was returned into the system by a process I shall describe hereafter. From the solid portion the cells arise in the following manner: The first appearance of a cell, such as is seen at *b* in fig. 1, is in the form of the small body marked *a*, and is named the nucleus; around this a little bladder forms, filled with fluid, or, in the case of other structures, frequently with solid matter. But as it becomes older, and other cells form beneath it, it is pushed to the surface by their growth, becoming, at the same time, gradually flatter, until it appears as a thin scale, as at *e*. In this state, its uses having been accomplished, and the period of its existence having expired, it falls off. In the formation of what is called cellular tissue, of which many of the internal organs of the body are formed, the cells, instead of becoming flatter, elongate, and, their thin ends uniting, they eventually form the fine fibres of which that structure consists.

Fig. 1.



Oblique section of a piece of scarf-skin.

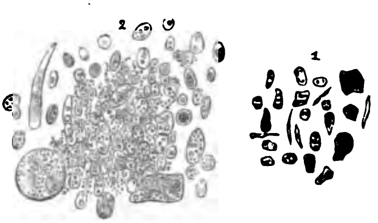
a points out the nucleus or first appearance of a cell. *b*, the perfect cell, the small line points to the nucleus surrounded by the little bladder filled with fluid or semifluid contents. *c*, *d*, *e* show the cells in a further stage of development, the round bodies being the nuclei. *f* points to the true skin, from whose blood-vessels the fluid is poured out that produces the cells of which the scarf-skin is formed.

But it may be asked, by what power does the blood pass through these various changes? This is a question we can no more answer than we can explain the process by which the oak springs from the acorn, or, why many seeds, which to us seem so similar, should produce plants differing in colour and in properties.

But, although we are unable to explain why, from the same blood, cells should arise which form tissues different in their nature and uses, we are, nevertheless, acquainted with certain conditions requisite for their development. One of these is, that there should be an adequate supply of blood, and another, that the blood must, also, be of a proper constitution. Supposing that the blood be so impoverished, that the cells, instead of being developed, should stop short in the early stage of the process, it is perfectly evident that disease must be produced. This is the case in scrofula and in consumption, and it is from this circumstance, apparently so simple, that such a large portion of the human race is annually swept off by death. Fig. 2 is a piece of what is termed tuberculous matter highly magnified, and this, as will be shortly explained, is the substance which, when deposited in the lungs, causes the symptoms of consumption.

The structure of tubercle, in the early stage, is very simple. It seems to consist, as seen at 1 in fig. 2, of a number of cells, which are small, stunted, and angular, and have often no nucleus within them; they are, in fact, cells whose development has been arrested, and they, consequently, show a want of power in the blood itself.

FIG. 2.

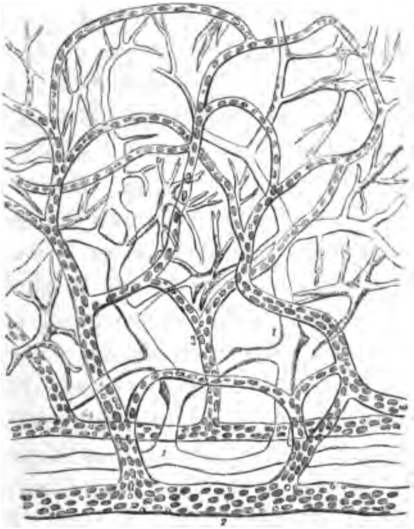


Tuberculous matter, highly magnified.

1 shows numerous cells, most of which have no nucleus. 2 is a representation of tubercle, as it is first deposited in the lungs in consumption.

I before stated, that all of the fluid part of the blood which was thrown out of the vessels was not required for the nourishment of the surrounding structures, and it might be, therefore, reasonably supposed that, in cases in which tubercle is formed, disease will be elsewhere produced. To discover where this is most apt to take place, we must trace the course of that portion of the blood which is not employed in growth. In almost every part of the body in which blood-vessels exist, there is also an extensive network of vessels called lymphatics or absorbents. They can be best seen in the skin, and are so numerous, that when they have been artificially filled with quicksilver, the whole structure appears composed of them. In fig. 3 may be seen the network of smaller blood-vessels interlaced with the lymphatics, as they appear in the tadpole, when placed

FIG. 3.



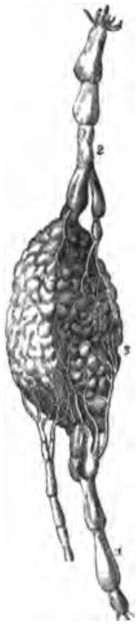
Lymphatics and blood-vessels of the tadpole, highly magnified.

1 points out the lymphatics forming a network and uniting to form the large vessel seen at the bottom of the figure. 2 the veins, and 3 the arteries, both filled with particles of blood; they unite to form a network of small vessels, called capillaries.

under the microscope. It will be observed, that the smaller lymphatics unite to form larger ones, as at 1, fig. 3; and this is repeated until a few large vessels are produced which transmit the contents of the network of a whole limb. The larger lymphatic trunks in the human body end by uniting in a single vessel, which is named the thoracic duct, and which opens into a vein near the heart. The blood is supplied to the body by the heart (see 3, fig. 5), which forces it through a system of pipes attached to it, termed arteries (see 5, fig. 5). These pipes divide into very small vessels, named capillaries (see fig. 3 and fig. 22), which unite to form large tubes called veins (see 7, fig. 5), which, by being connected with the heart, return the fluid into that organ. Let us suppose that a portion of blood is forced from the heart along the blood-vessels; then as soon as it reaches the small arteries, such as are figured in plate 3, and marked 3, a small portion of the liquid part of it oozes through their coats (the remainder of the blood being returned to the heart by the veins) and supplies the neighbouring structures with nourishment; whilst the part not required for that purpose enters the small lymphatics, marked 1, and is returned by them to the heart to be mixed again with the blood There is thus a double circulation of the blood through the animal frame, the centre of both being the heart; in the one case the circle is formed by the blood-vessels alone, in the other it is composed partly of the arteries and partly of the lymphatics.

In certain parts of their course the larger lymphatic trunks are twisted upon themselves, as seen in fig. 4, so as to form what is termed a lymphatic gland. These bodies are placed in great numbers in the sides of the neck, in the membrane near the bowels, in the groin, armpit, and other concealed situations.

FIG. 4.



Lymphatic gland injected with quicksilver.

1 and 2 point out the lymphatic vessels entering into and passing out of the body of the gland, marked 3.

We might naturally suppose that in any disease of the fluid circulating in the lymphatics, the effects would be first observed where the twisting of the vessels affords the greatest chance of obstruction; and such is found to be the case in the disease called scrofula or king's evil. In this disease the tubercle, instead of forming in the lungs, as in consumption, is deposited in the lymphatic glands, and there produces the symptoms which characterise the complaint.

When tubercle affects the glands of the lymphatics leading from the bowels, a very formidable complaint is the result. Under such circumstances there is usually long-continued diarrhœa; and as a great portion of the food ordinarily passes through the lymphatics of the intestines before entering the blood, in disease of these glands there is a rapid loss of flesh and strength. But if, on the contrary, the glands of the neck become the seat of the malady, they swell so as to cause small lumps. These increase until matter is formed in them, when the skin bursts and troublesome sores are left, which may be distinguished by their thin, red edges, and pale surface.

It must not be supposed that all swellings of the glands are scrofulous, for they may arise from any irritation, such as a bad tooth or an inflamed corn, but, in the majority of cases, they are caused by a constitutional affection.

Scrofula often produces serious consequences without the deposition of tubercle. When any part of the body is inflamed, the greater portion of the swelling that attracts the eye of an observer arises from the liquid part of the blood which has oozed from the over-distended blood-vessels; and, in a healthy state of the system, certain changes take place which prepare this liquid for being again taken up into the blood as soon as the inflammation ceases. But in scrofulous constitutions the blood has not sufficient vitality to undergo the necessary changes, and the formation of matter is the consequence. In this way many inflammations of the glands in which there is no tubercle deposited produce the sores I have before noticed. It is a subject of common remark that bruises or wounds, which, in some persons would be considered trifling, cause in others serious effects; and the explanation of this is, that the inflammation produced in this latter class is of a scrofulous character.

One of the most frequent diseases connected with a scrofulous state of the blood is white swelling of the joints. In this complaint, a trifling sprain or other injury often produces inflammation which destroys all the structures entering into the composition of the part; and the difficulty of curing such cases depends, not so much upon the local affection, as upon the weakened state of the blood, which prevents the processes necessary to repair the injury received by the bones and cartilages.

In other instances, where the blood has not become so greatly impoverished, the scrofulous constitution displays itself by causing long-standing inflammation of the edges of the eyelids, white specks upon the eye, inflammation of the nose or ear, or troublesome eruptions upon the skin.

It is interesting to observe how very common scrofula was some centuries ago compared with what it is in the present day. At that time, the want of proper food and clothing, and the general habits of the people, appear to have combined to produce a fearful prevalence of this disorder. It was a popular belief that the touch of a king could remove the complaint, and, consequently, crowds were in the habit of thronging round their sovereign in the hope of receiving health from his hand. The least-educated person, in the present day, would laugh at such a remedy, as devoid of all reason; but it is not more absurd than many of the follies of homœopathy and mesmerism which are now greedily swallowed by the multitude.

CHAPTER II.

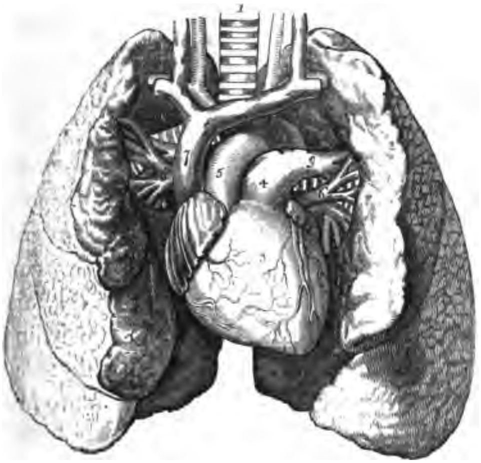
I SHALL, in the present chapter, direct attention more particularly to the nature of consumption; requesting my readers to remember that the causes of scrofula and consumption are the same in almost every particular, as is also the method of preventing them. Consumption claims especial attention from the vast mortality produced by it, and also from the many popular errors which exist respecting it. I have before stated that it is not a disease only of the lungs; but, as most of the symptoms arise from the affection of these organs, it is necessary that the reader should be made acquainted with their healthy structure and uses, before attempting to understand the nature of the complaint.

In describing the destruction of the particles of the human frame, which is continually going on, I stated that when dead, and about to be removed, they were reduced either into the form of gas or fluid. The chief, if not the only gas thus formed, is named carbonic acid, which is the air that forms the froth in soda-water. It will be necessary to introduce a few chemical remarks, in order to explain how this is produced in the blood.

All the structures of the animal body, when reduced to their original elements by the aid of chemistry, are found to be mainly composed of a substance called carbon, and of three gases, named oxygen, hydrogen, and nitrogen. Now, if charcoal, which is mainly composed of carbon, be burned, heat is evolved, and carbonic acid is set free. This gas when taken into the stomach in an effervescing liquid is not injurious, but if received into the lungs it is a deadly poison, and every year persons are found suffocated who have incautiously gone to sleep in an apartment heated by a charcoal fire. The blood as it passes through the lungs absorbs a large quantity of atmospheric air, which is carried along with it to every part of the body. Wherever it comes in contact with a particle in the act of decomposition a sort of combustion takes place, and the same results are produced by the union of its carbon with the atmospheric air, as occur from the burning of the charcoal, namely, the production of carbonic acid gas, and of heat. Thus, every one of us has, as it were, a charcoal fire in his own body, and, by this means, the animal heat is chiefly kept up. The carbonic acid dissolved in the blood replaces the atmospheric air which it before contained, and is, of course, as deadly a poison, if allowed to remain in it, as it is when introduced from without. Now, the use of the lungs is to free the blood of this noxious gas, and if this is, by any means, prevented, as by strangling, death is the necessary consequence.

All nature's works are fitted to perform the purposes for which they are intended; and, in the human structure, perhaps no organs display more beautiful design than the lungs; the perfect arrangement of their parts admirably adapting them for the performance of their important functions.

FIG. 5.



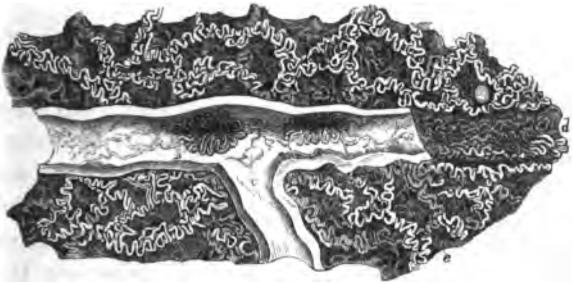
Front view of the heart and lungs.

1. The windpipe. 2. The lungs. 3. The heart. 4. The artery which carries the blood from the heart to the lungs. 5. The artery that carries the blood from the heart to be distributed to the whole body. 6. The veins that return the purified blood from the lungs to the heart. 7. The vein that returns part of the blood from the body to the heart. 8 is placed above the right bronchial tube; that on the left side being behind 6. They arise from the division of the windpipe. 9. The branch of the artery from the heart to the lungs, that passes to the right lung.

The lungs are two spongy bodies, which, together with the heart, fill up the whole of the hollow of the chest. Many persons seem to be under the impression that they are only in the front part of the body, and sometimes surprise is expressed at the back being examined by medical men in cases of disease. In fig. 5 it will be seen that the lungs communicate with the air by means of a long tube named the windpipe, and marked 1. (See also *i*, fig. 16.) This lies in the front of the neck, covered only by the skin and fat, and reaches from below the tongue into the chest. In its upper part it is closed by a valve called the epiglottis (see *h*, fig. 16), which prevents food from passing into the windpipe when the person is in the act of swallowing. Below the epiglottis is the apparatus for speech, which consists of small cords, that narrow or enlarge the opening of the windpipe at the will of the individual through the agency of muscles attached to them. (See *g*, fig. 16.) It is very common in consumption for small sores to form in this part of the windpipe, and partial loss of voice is, in such cases, the necessary result. Slight colds, by inflaming the parts surrounding these cords, often produce the same effect.

The windpipe, after its entrance into the chest, divides into two tubes, which enter the substance of the lungs. (See 8, fig. 5, and *k*, fig. 16.) Each tube immediately divides again into two, and is surrounded by the air-cells; and this method of division is continued until they attain a great degree of minuteness, and are distributed to every portion of the organ.

FIG. 6.



Bronchial tube surrounded by air-cells. Copied from Mr. Rainey.

a. Bronchial tube. *b.* An air-cell opening into the tube, the opening being surrounded by blood-vessels. *d.* Intercellular passage. *e* points to an air-cell. In the rest of the figure the light waving lines represent blood-vessels surrounding the dark spaces, which are air-cells.

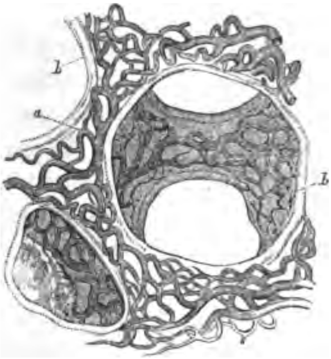
The above description will be better understood by looking at figs. 6 and 10, in the latter *a* points to a tube dividing into two. These continuations of the windpipe are called bronchial tubes; they are composed of a firm substance, and are provided with muscles which can contract them; whilst they are lined internally with a membrane somewhat similar in structure to that which covers the inner surface of the mouth and throat. When inflammation attacks this membrane it is named bronchitis.

Each bronchial tube terminates abruptly by becoming continuous with a membraneous passage (marked *d*, fig. 6) into which the air-cells (marked *e*) open on every side. It is named the intercellular passage, and is not lined by the membrane of the tube.

The greater part of the substance of the lungs consists of small cavities called air-cells, which give it its spongy appearance. (See fig. 7.) Each of these cells is formed of the same membrane as the intercellular passages, and has no other lining. They are of different shapes, and communicate very freely with the neighbouring passages, but not with each other. When inflammation occurs in this part of the structure of the lung it is called pneumonia. In breathing, the air first enters the windpipe through the nose or mouth, passes through the bronchial tubes into the intercellular passages, and thence into the air-cells.

As I have described the manner in which the air obtains entrance into the lungs, it will be necessary to direct attention to the method by which the blood is brought into contact with it. After the blood has traversed all parts of the body, and become loaded with carbonic acid gas and other impurities, it is returned to the heart. (See 7, fig. 5.) By the contraction of this organ it is pumped into a large blood-vessel, as seen in fig. 5, marked 4, which, dividing into two (see 9, fig. 5), carries the impure blood into each lung. The blood-vessels in the lungs, by continual divisions, attain a great degree of minuteness, and form a very close network between the air-cells. These networks of small vessels will be best understood by looking at fig. 7, which is a representation of an air-cell and its blood-vessels highly magnified. The interspaces between the vessels in the human

FIG. 7.



Magnified air-cell, from Rainey.

a. Blood-vessels surrounding the air-cells, and forming a very close network. b points out the lining membrane of the air-cells.

lung are smaller than those between similar networks in any other part of the body. By these smaller vessels being placed between two contiguous air-cells, the blood contained in them is freely exposed to the action of the air. After being thus purified the blood is returned by the veins of the lungs (marked 6 in fig. 5) into another of the cavities of the heart, whence it again issues, to be used, for the nourishment of the body, through the vessel marked 5, fig. 5.

It is obvious that, however otherwise perfect may be the construction of the organs for purifying the blood, they would be valueless unless there existed a provision for frequently renewing the air thus brought into contact with the vessels. This is effected by the movements of the chest, and to this I shall next draw my reader's attention.

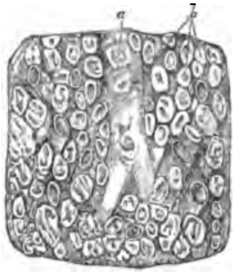
The walls of the chest are composed chiefly of bones, arranged in a peculiar manner. (See fig. 12.) At the back part is a range of small bones placed one on the other, which together form the spine, marked *a*, fig. 12. In front is a broader one, which is firm and strong, so as to enable it to resist injuries, and which is named the breast-bone, marked *c*, fig. 12; and attached to these, by joints, are a number of bones termed ribs, marked *b*, fig. 12, which, in the front, are joined to the breast-bone by gristle, marked *d*; and in the spaces between each rib are situated muscles, which, by contracting, draw them nearer to each other. The lower part of the chest is closed by a muscular partition called the diaphragm, which is attached to the lower ribs.

In an ordinary state of breathing, the muscles between the ribs draw these bones nearer to each other, and upwards; whilst the diaphragm, which in a state of rest is curved, by contracting, expands the chest at the lower part, and forces downwards the stomach and bowels. The cavity of the chest being thus enlarged a vacuum is necessarily produced, and the air rushes through the windpipe into the lungs. While the air is in the cells the chemical changes, before described, take place; and the impure air is expelled by the lungs and the sides of the chest returning to their former position by the force of their own elasticity.

The blood is forced along its vessels by the action of the heart, which is a species of force-pump, composed of muscle. But besides the motion derived from this source, the alternate enlargement and decrease in the size of the chest, during breathing, assist in propelling the streams of blood. It will be, therefore, easily understood that exercise, by quickening both the breathing and the action of the heart, must exert considerable influence in preventing any overloading of the blood-vessels, and that sedentary employments, on the contrary, contribute to their congestion.

From what has been now explained, the nature of these changes in the lung, which constitute the disease termed consumption, will be readily understood. In the former chapter it was mentioned that this and many other complaints originate in a disease of the blood, and that from the unhealthy condition of this fluid a deposit of a matter named tubercle takes place. When, therefore, the lungs, either of a man or animal, in the first stage of consumption, are examined, they are found, in certain parts, filled with hardish bodies of a gray or dirty yellow colour, varying in size from a mustard seed to that of a small pea. (This matter, when magnified, is seen in fig. 2, marked 2.) These are known by the name of tubercles, and, in their microscopic appearance and chemical composition, they closely agree with the tubercular deposits which occur in the glands and other organs of the body. But it may be asked, in what part of the lungs are these produced? This can be answered by looking at fig. 9, in which it will be seen that the rounded form of a small tubercle arises from the matter filling one or more of the air-cells of the lung. I have also introduced fig. 8 to show the appearances which present themselves, when the lung is cut into, in the earlier stages of the disease. I have said that tubercular matter is, in the first instance, a fluid, and in fig. 9 it will be observed how exactly the two air-cells, there figured, and marked *c*, have been choked up with the diseased matter, which has afterwards be-

FIG. 8.

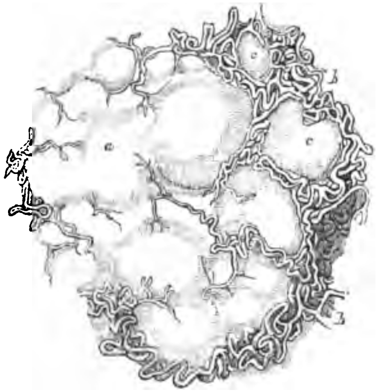


Deposit of tubercle in the lungs in an early stage.

a. Bronchial tube. *b*. Tubercles filling up the structure of the lungs.

come solid. Two neighbouring air-cells in this condition have a tendency to unite, because the pressure exerted by their contents obliterates the thin wall and the blood-vessels which separate them. By a number being thus fused together, the larger tubercles are produced, as seen at *a*, fig. 9, whilst the very small ones consist of single cells alone. When a considerable portion of the air-cells are obliterated, the sides of the smaller bronchial tubes leading to them are pressed together; and they are finally converted into small hard strings. In cases in which the

FIG. 9.



A tubercle of the lung, magnified. Copied from Rainey.

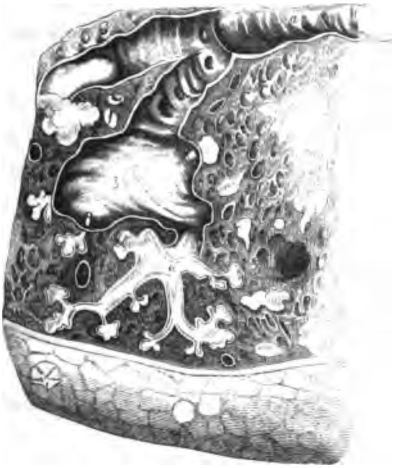
a. Tubercle, which has broken down the walls of the air-cells in which it was deposited, a few of the blood-vessels, originally surrounding the cells, alone remaining. *b.* Blood-vessels. *c.* Single air-cells, filled with tubercular matter.

tubercle progresses so as to produce death, a number of further changes are observable in the lung.

I must recall to my reader's remembrance that in the condition of the blood in which tubercle is formed, an attack of inflammation, in any part, is apt to produce dangerous consequences. Now this is one reason why consumption is so difficult to cure. The blood-vessels surrounding tubercular matter become gorged with blood, or in that state which is called inflammation. The tubercle, not being capable of forming part of the structure in which it is placed, excites the inflammatory action, on the same principle that any other dead substance, such as a thorn in a finger, brings on inflammation around it. The first effect of this condition upon the tubercle itself, is to fit it for being expelled from its position; and, so far, therefore, a beneficial change is produced. Its substance becomes softer, and, when examined under the microscope, its small cells are found broken up into granules. Whilst this is going on, the unhealthy inflammation is destroying the neighbouring structures, so that when the tubercular matter is expectorated, by means of coughing, a hole or cavity, as seen in fig. 10, is left in its place.

From large quantities of the substance of the organs being thus got rid of, we often find the upper part of the lungs completely riddled with holes, or, in other instances, the cavities run together, and a perforation of enormous size is the result. In this way it happens that, in one half of the cases of consumption, cavities of the size of a goose's egg or a clenched fist, are found to exist. The walls of these cavities are often ragged, and formed of hardened lung, containing a quantity of tubercle; and into them usually open a number of the larger bronchial tubes, so that the matter readily escapes. In other cases, they are lined by a membrane, which produces the matter expectorated.

FIG. 10.



Cavity of the lung. This figure is of course much less than the natural size.

a. Bronchial tubes. *b.* The cavity.

In almost every case the deposit of tubercle commences in the upper part of the lung, and ordinary inflammation as generally begins in the lower. This arises from the smaller degree of motion which the upper part of the chest performs; and it is a fact which must be remembered, in order to understand many future remarks.

We often hear persons asserting that some acquaintance of theirs lived for many years with only one lung; but such is usually an exaggeration, and the fact, in such a case, has been that a large cavity has existed in the upper part of the lung, whilst all the lower and larger part has remained healthy. Occasionally, however, a lung is compressed and rendered useless by fluid thrown out into the cavity of the chest; and if this takes place in a person who has also deposit of tubercle, it is seldom the patient recovers.

From what has been just said, it will not be difficult for my readers to understand many of the symptoms of consumption. When any accident happens to a watch or other piece of mechanism, an alteration in its working necessarily follows. It may lose or gain time, may stop, irregularly or altogether, and thus the watchmaker generally knows the nature of the injury. In like manner, when any part of the human body becomes altered in structure, its offices are performed in a less perfect manner than when in a healthy condition. These alterations of functions constitute, for the most part, what are termed the symptoms of diseases; and I shall now draw my reader's attention to a few of them, not with the expectation that he will be thereby enabled to discover when consumption exists, but rather that he may be able to estimate their significance.

One of the most prominent and distressing symptoms of consumption is cough. Every one knows, practically, what this is; but perhaps few have ever inquired or thought anything about its actual nature. I explained that in drawing in the breath, contractions of the muscles between the ribs, and of the diaphragm, increase the cavity of the chest; and that, when a person breathes out the air so taken in, the motion is chiefly effected by the lungs and chest returning to their natural position. Now, cough is nothing more than sudden expiration, in which the air is forcibly expelled from the lungs by the muscles situated between the ribs. The rapidity with which the air traverses the bronchial tubes and windpipe enables it to carry up any substance contained in these passages. It may be caused by the will of the individual, or any irritation of the nerves supplying the lungs or windpipe may produce it even against his wish.

In the earlier stages of consumption the cough is short and without any expectoration, and it often continues, without producing alarm, for many months before any other symptom manifests itself. At this time it generally arises from the tubercle, deposited in the air-cells, irritating the nerves distributed to the lungs; but, afterwards, when expectoration is present, it is, to a certain extent, useful, both in clearing the tubes and, also, by increasing the forcible inspirations that usually follow the action of coughing. Wherever a cough has continued more than a few weeks, especially if it has not been preceded by discharge from the nose or other symptom of a common cold, attention should be directed to it; and if the person so affected belong to a scrofulous or consumptive family, the greatest watchfulness should be used. But, on the other hand, let no one imagine that the existence of a cough necessarily indicates consumption; for the irritation of the nerves producing it may arise from many affections of the throat or windpipe; from any disease affecting the heart or lungs; from worms; disordered stomach, bowels, kidneys, or liver; or, in fact, from most of the complaints which affect the organs of the chest or digestion.

If cough can arise from so many different disorders, the folly of attempting to treat it, in all cases, by one remedy, will be apparent. Almost every family has some favorite recipe for a cough; and the pages of every newspaper contain numerous advertisements of drops, pills, and lozenges, especially devoted to the cure of this symptom. As most of these contain some portion of opium or ipecacuanha, which have the effect of relieving the irritability of the nerves of the lungs and windpipe, and as the generality of coughs arise from this cause, all these preparations attain some degree of reputation. But nothing is more foolish than for persons to continue, week after week and month after month, in the use of these remedies, without ascertaining from what cause the cough actually arises. Every medical practitioner has constant reason to deplore the best and most hopeful period of a case wasted in the continual use of such remedies; and often the digestion is injured by the sweets which they contain.

The employment of empirical remedies arises from popular ignorance respecting the principles of scientific medicine. An empiric treats a cough as a disease, and uses for it various drugs which he has previously found useful. But a scientific practitioner first ascertains whence the cough arises before attempting to prescribe for it. It may be connected with consumption, and, in such a case, he looks upon the alteration of the blood as the first object for his attention; or it may be produced by an ordinary cold, when the same remedies, as used by an empiric, will probably prove sufficient for the purpose of giving relief.

Expectoration is usually not present in the commencement of consumption; the cough being dry and hacking. Afterwards, however, the cough is accompanied by a whitish, gluey matter, which chiefly occurs in the morning. As the disease advances it becomes thicker, often containing white particles; and, in the last stages, it is usually in the form of thick yellow masses. In the earlier periods it is furnished by the bronchial tubes, and, even at the last, the greater part comes from this source. During the softening of the tubercles, and when inflammation exists around them, the expectoration necessarily contains portions of the tubercle itself and of the fluids thrown out from the vessels; but, as the greater part is always produced by the inflammation of the bronchial tubes, it will be evident that it is impossible for any patient to ascertain the existence of consumption by inspecting the discharge. Many persons place expectoration in a glass of water, and profess to decide by its sinking that consumption is present. Such a plan is quite useless, as the floating or sinking of expectoration depends more upon its shape and nature than upon the structure of the part from which it has been derived. Under the microscope we can often perceive, in the later stages, small particles of the elastic tissue of the lung; but it is only when magnified that this evidence of disease is obtainable, and the stories, so often told, of patients expectorating pieces of their lung are quite devoid of truth.

In more than one half of the cases of consumption blood is expectorated; and it frequently betokens either a slow or a hopeful case. It varies in amount, from a few streaks, mixed with the expectoration, to one or two pints. It is a symptom that should never be treated lightly; but the slightest appearance of it should be considered a sufficient reason for calling in medical aid, more especially if there be a predisposition to disease of the lungs. At the same time, it must be remembered that it frequently occurs in other diseases besides consumption; and that, therefore, it does not necessarily indicate that complaint. It often happens that severe attacks of bleeding take place from the gums when the teeth are much decayed, and I have seen more than one person subjected to most rigorous treatment, under the idea that consumption was imminent, when the symptoms arose from this cause alone. The blood which is expectorated in consumption is furnished by the vessels surrounding the deposits of tubercle.

As was before stated, the act of breathing is effected by the muscles of the chest. Although this action is partly under the government of the will, it is also involuntary, as may be seen by the impossibility of any one stopping it altogether. Under ordinary circumstances it takes place without any sensible effort; but when anything occurs to prevent the entrance of the air a feeling of oppression is produced. It will not, therefore, be difficult for those who understand how the cells of the lung are choked up with tubercle to comprehend that difficulty of breathing is a very general symptom in consumption. It is usually increased by the expectoration contained in the bronchial tubes preventing the free passage of the air in and out of the air-cells.

I have so frequently impressed upon the mind of my readers the fact that consumption is a general and not a local disease, that I need scarcely remark, that other organs besides the lungs are liable to be affected during the progress of the malady. We, consequently, find deposits of tubercle take place in the glands of the bowels, in the membrane covering the intestines, in the brain, and in other parts; and symptoms, depending upon these complications, often distract the mind of the patient from the real nature of his disease. One of the most troublesome symptoms that occur during the progress of consumption, and one that tends more than any other to weaken the sufferer, is diarrhœa. It often arises from weakness of the lining membrane of the bowels; but, if long continued, it is generally connected with deposits of tubercle and subsequent ulcerations of the glands of the intestines. It is from this cause that this symptom is so difficult of removal, and so often bids defiance to the best-concerted measures of the physician.

One of the earliest symptoms of consumption is the loss of flesh; and, perhaps, no case goes through all the various stages of the disease without it. It varies greatly in amount, in some instances being so gradual as to be scarcely perceptible, whilst in others it is so marked that it cannot fail to attract attention. Whenever a person, predisposed to consumption, becomes much thinner, without evident cause, even if he be without cough or expectoration, medical advice should not be neglected.

I have shown that none of the above symptoms, although they are generally present in every case of consumption, necessarily indicate the disease; but that a person may exhibit one or all of these without having any tubercular deposit in the lungs. But it may be asked whether there is no more certain mode of discovering the existence of consumption. In answer to this inquiry I must remark, that a well-educated physician seldom judges by symptoms alone, but prefers to satisfy himself by calling in the aid of his hearing. There are few things in medical practice that seem more mysterious to a non-professional person, than the detection of a fatal disease by the stethoscope; and yet nothing is more simple in theory. It may be observed that in the examination for consumption, the physician both strikes with his fingers different parts of the chest, and also listens to the breathing. The first of these actions is called percussion, and its use can be readily understood.

Every one knows that a drum gives a loud, clear sound when struck, because it contains air; and that if it were filled with water, or with any solid matter, a duller sound would be produced. In like manner, when the air-cells of the lungs are filled with air, a clear note is elicited when beaten with the fingers; but, of course, when the cells are filled with tubercular matter, the sound becomes duller in proportion. Also, if water, by compressing the lung and forcing out its air, fills the cavity of the chest, the same change from the natural sound will be produced. A practised ear can, therefore, thus distinguish the condition of the air-cells, and can ascertain the existence of disease before any symptom has been exhibited by the patient.

As in every inspiration the air rushes from the windpipe into the bronchial tubes, and thence into the air-cells, it can be heard passing through these parts when the ear is placed upon the chest. But it will be evident that if the air-cells are choked up with tubercular matter, less sound will be produced, and thus the existence of disease may be discovered. If the bronchial tubes are filled with fluid, a number of bubbling noises are heard from the air bursting through it, and other sounds arise from the tubercular matter pressing upon the bronchial tubes and partially obstructing the entrance of the air. It will be also seen that, although the science of auscultation, as listening to the chest is termed, affords most decisive means for ascertaining the existence of disease, the theory upon which it is formed is extremely simple. It must not, however, be supposed that the practice of the art is equally easy, or that every one listening to the chest of his patient is sure to arrive at truthful conclusions; for there are many cases, more especially in the earlier stages of consumption, where great skill and practice are required to avoid mistakes.

The stethoscope is the instrument generally used for listening to the sound of the lungs, and many persons seem to imagine that by it, and not by the ear of the practitioner, the existence of disease is ascertained. It is, however, nothing more than a wooden trumpet, and is useful in avoiding the unpleasantness or indelicacy which often attends the necessity of placing the ear upon the chest of a patient.

CHAPTER III.

THERE is no part of this subject so likely to attract the attention of my readers as the question whether consumption admits of cure. We have, hitherto, seen only the destruction of the tissues which follows the deposition of tubercular matter; and it may be, therefore, supposed that such is the invariable consequence. This, however, is not the case, as in a certain number of instances we can trace changes having a curative tendency. The popular opinion is so general that when the lungs are once affected the case of the patient is hopeless, that considerable surprise will no doubt be excited in the minds of many by the above observation; but there is really no reason why nature should not repair an injury of these organs, as she does those of others less important for the carrying on of life. Every one admits that ordinary inflammation of the lung is curable, although the air-cells in this complaint are filled with matter, and cavities are not unfrequently produced. There is, therefore, no reason for denying that a similarly happy result may take place in consumption if the disease in the blood which gave rise to it can be removed.

All anatomists of much experience have met with cases in which the lungs contained tubercles, although no symptom indicated their presence during life. The number of instances in which this takes place is greater than is generally imagined. Thus, Dr. Williams found traces of tubercular disease in the lungs of half of the bodies he dissected who were above forty years of age; Dr. Bennet discovered a similar condition in twenty-eight, out of seventy-three; whilst at an hospital for aged persons, in Paris, out of one hundred who were examined after death, fifty-one had traces of tubercular disease of the lung, and in five of these there were marks of cavities which had healed. It is evident, therefore, that not only is the deposition of tubercle in the lungs a very common complaint, but that, also, the recovery of such cases is not unfrequent; and this is quite in accordance with what we observe in other parts of the body, as for instance in tubercular disease of the glands. The explanation of the cases of cure is in all probability that the disease in the blood had been so slight as to disappear after the formation of the tubercle, and that, therefore, unhealthy inflammation was not excited around it.

It is interesting to remark the changes which the tubercular matter undergoes in the progress of cure.

In one form of recovery, the softer parts of the tubercle are taken up into the system, and the remainder is converted into a tough, leathery substance. In other instances, the tubercle appears to dry up until nothing is left but a piece of stone, composed chiefly of salts of soda and potash; at the same time changes take place in those parts of the lung which have been injured by the deposition and pressure of the tubercle; so that when we examine such cases after death, we find the air-cells obliterated, and the bronchial tubes leading to them greatly diminished in size. It is not uncommon for patients, in whom this natural cure has taken place, to cough up small stones; and this, of course, is a most favorable symptom.

In most of the cases which I have just mentioned, no very prominent symptoms have existed, and we only discover that tubercle has been cured by an examination after death. It is, therefore, reasonable to suppose that the disease in the blood has either been removed immediately after the production of the tubercle, or that it has never proceeded to such an extent as to produce the *symptoms* of the disease we call consumption. But, however interesting it may be to the pathologist to be able to prove that tubercle is curable, it is evidently of more importance to the unprofessional public to know whether the complaint can be removed after it has reached to such an extent as to produce cough, wasting of the flesh, and the other well known appearances of "decline." There is no doubt that cure is possible; and that patients who have presented every mark of the complaint have been restored to health. In the earlier stages, before the tubercle has softened, it may be rendered harmless by the process I have before described; but even when it has been expectorated, and large cavities have thus been left, these have been known to heal, and all symptoms to disappear in consequence. Occasionally, although the cavities have not been healed, they have ceased to form matter, the bronchial tubes leading to them have closed, and many years after, when the patient has died from another disease, dissection has proved the serious nature of his former malady.

In children, consumption is more easily cured than in adults, partly because at that early period of life injuries to important organs are more readily repaired; and partly because the complaint is often situated in the glands of the lung, and not in the lung itself. But, however medical practitioners may differ in their views as to the curability of consumption, all agree that, by timely and judicious treatment, life may be prolonged, and much suffering avoided.

I should be sorry if by the above remarks I were so far to mislead my reader as to allow him to suppose that consumption is not a complaint of the *utmost* *danger*. Although recovery may take place in some cases, especially when treated in the earlier stages, yet, in the majority, the utmost efforts of the physician will prove unavailing to remove the disease, and will only be useful in the mitigation of suffering and the prolongation of life.

CHAPTER IV.

Before entering upon the immediate subject of this chapter, it will be necessary for me to remind my readers that there are two classes of causes of disease, viz., those which predispose, and those which excite. I will attempt to explain the difference between them by the following illustration. A man who has a wooden leg is evidently more liable to fall than if both of his limbs were perfect; but, at the same time, the actual cause of his falling may be a blow, or a stone in his path, or a strong gust of wind. The predisposing cause of his accident is the loss of his limb; the exciting cause is whichever of the above circumstances may have produced it. In like manner, a person is predisposed to consumption from his parents having suffered from the disease; but the exciting cause may be some circumstance connected with his habits or occupation.

Hereditary transmission, that is, the transmission from a parent to a child of a tendency to disease, is undoubtedly the most common predisposing cause, both of scrofula and consumption. As I have before so frequently insisted upon the fact, that both these diseases arise from the same condition of the blood, it will be readily understood that they will both be produced by the same circumstances. This must be borne in mind, as from ignorance of it many persons deny that there is any tendency to consumption in their family, because the prominent symptoms of the maladies from which their relations have suffered have not been those of disease of the lung. For instance, a person affected with consumption declared he had no hereditary tendency to it, but admitted that his father had died of diseased hip-joint, and two or three of his brothers and sisters of water on the brain. Now as both these complaints are connected with a tuberculous condition of the blood, there was every reason to believe that he inherited the disease.

The grandparents may transmit these diseases, although the mother and father may remain apparently healthy, as it is a well ascertained fact that some complaints pass over one generation. Of course, where parents acquire the disease after the birth of the children, there will be no transmission.

There is often great difficulty in ascertaining the fact of hereditary transmission, from a foolish desire upon the part of the patients to conceal it. If a patient be forced to allow that some part of his family has been so affected, he often insists upon its having been produced by some particular cause. Nothing can be more childish than such conduct, as true information upon this point is of the utmost value to the physician, and the patient may suffer from any concealment of the truth. It is often attributed to cold or some other imprudence, but it will be hereafter seen that such a cause is not sufficient to produce the complaint, unless the blood be likewise diseased.

There have been numerous attempts made to estimate, by figures, the number of consumptive persons who have derived the disease from their parents. Portal believed that two thirds of the whole number were hereditary; Piorry, one quarter; Ruysch, four fifths; whereas, in the Brompton Hospital, only one third seemed to have received the complaint from their father or mother. In cases where both parents are of consumptive or scrofulous family, I believe it to be almost certain that their children will be affected *in some degree* with the one or other of these maladies. Of course, from the marriage of cousins where there is a tendency to disease, we may expect the children to be unhealthy. If only one parent be affected or be predisposed to disease, there is a much less chance of hereditary transmission; and it is from this circumstance that we may hope that scrofula and consumption, in process of time, may become much less common than at present.

It is a curious observation that the chances of being affected by consumption usually increase with the number of children; so that we often find the younger ones die before the elder of this complaint. It must not however be supposed, that because one of the parents is unhealthy the children must *necessarily* die of consumption, for it sometimes happens that where the greater number of a family have been affected with it, others, who have been more favorably circumstanced, have been able to ward it off, and live to an old age. But what I wish particularly to impress upon my reader is, that where these complaints are hereditary, any member of the family is much more liable to them than other persons; and it is therefore necessary for him to exercise the most jealous care of his health.

Sex appears to be a predisposing cause of consumption, although a difference of opinion exists upon this point. In many towns the males are found to suffer more than females, although, in the country at large, the opposite is the case. This difference probably arises from the occupations of the sexes, which differ so much in the various towns of the kingdom. It has been conjectured by some writers that the great liability of women to consumption arises, not from any peculiarity of constitution, but from their sedentary habits, and from the confinement of the motions of the chest by stays.

There is a popular belief that certain ages predispose, and no doubt there is considerable truth in the opinion. Persons of all ages, however, are affected with consumption, for it is frequently found in infants; and Laennec dissected the body of a woman who died of this disease at the advanced age of ninety-nine years. It is most commonly observed in persons between twenty and thirty years of age; and hence has arisen the opinion that the liability diminishes after that period of life. But, for practical purposes, we ought to ascertain, not how many die of a complaint at any certain age, but the chance that each one who has arrived at that period has of escaping it. This is a matter of considerable importance; for if it can be shown that, at the termination of any certain period of life, an individual becomes exempt from consumption, it is obvious that precautions against it may then be neglected. The following table has been calculated from the returns of the Registrar-General:

Years of age.	Number of Deaths from Consumption in both Sexes.	Estimated Population, middle of 1850, both Sexes.	Ratio of Deaths from Consumption to Population.
Under 5	5,915	2,248,793	1 in 432·8
5 to 15	3,998	3,900,267	1 in 975·5
15 to 25	12,946	3,364,841	1 in 259·9
25 to 35	12.133	2,630,936	1 in 216·8
35 to 45	8,507	1,901,103	1 in 225·4
45 to 55	5,310	1,375,169	1 in 258·9
55 to 65	3,363	891,868	1 in 265·2
65 to 75	1,519	519,027	1 in 341·6
75 to 85	314	204,675	1 in 651·8
85 to 95	24	32,646	1 in 1360·2

It is perfectly clear, from this table, that, if the above returns are to be trusted, there is considerable liability to consumption even up to 65 years of age; and that its apparent rarity arises more from the small number of persons at advanced ages than from the liability to the disease being very much lessened. Some hospital returns do not quite confirm this view of the case; but show the liability amongst their patients to have been greatest between 20 and 30, rather less between 30 and 40, and to have decreased considerably each 10 years after this period. In all probability the truth lies between these two returns; and persons predisposed to consumption are most apt to be affected before 30 years of age; but their liability, though diminished after that period, still continues until 65.

It will be seen by the foregoing table that the chances of consumption are comparatively small in children; and it will, therefore, naturally occur to the reader to inquire whether the number of cases expresses the numbers in which tubercular matter is actually deposited. This is not the case, for scrofula and other diseases dependent upon it more than counterbalance the amount of deaths from affections of the lungs. The same returns show us that enormous numbers of children below the age of 5 years are annually cut off by deposition of tubercle in the glands of the bowels; and that after that period it becomes comparatively infrequent. From the first year of life to ten years, water in the brain and other affections of that organ, arising from tubercle, are exceedingly common; and a great part of the mortality among children is thus produced.

Enlargement of the glands of the neck and diseased joints and bones chiefly occur in the earlier periods of life.

The practical conclusion to be derived from these facts is, that, in families in which scrofula or consumption is hereditary, the greatest attention should be paid whenever purging or pain in the bowels, attended by loss of flesh, takes place in children; or, whenever severe headaches, attended by vomiting, occur no time should be lost in obtaining medical assistance.

It has, from the earliest ages, been believed, that persons having a certain formation of body were predisposed to consumption. The characteristics of this temperament are supposed to consist in a light, fair complexion, light eyes and hair, frequently accompanied by fulness in the upper lip. That there may be some truth in this idea I do not deny, but accurate investigations lead us to believe that the influence of such a temperament is much smaller than was imagined.

There is a popular error that thin, weakly people are most liable to disease in the lung; and many confound weakness of constitution with weakness of muscular strength. This is so far from the truth that a person has been known to win a prize-fight and shortly afterwards to die of this disease; and many of its victims have been previously distinguished for their robust appearance.

There are few circumstances which more certainly predispose to consumption than mental anxiety; and nothing is more common than to see the gradual decay of one who has nursed a relation through the progress of the same complaint. The frequency of such cases has, in all probability, given rise to the opinion that consumption is infectious; but of the truth of this supposition we have not the slightest proof. Cases are recorded in which part of a family has been saved by entire separation, whilst those who remained at home afterwards suffered from the disease. Some of the most rapid cases of consumption that I have seen, have occurred in persons who, as soon as they have perceived the first symptoms, have abandoned all hope; the dread of the complaint appearing to hurry on the case to a fatal termination. It will, therefore, be seen how much may be done by moral treatment to ward off an attack from those predisposed to it; and, whilst every care and precaution is taken, the subject should be mentioned as little as possible, and everything tending to bring to remembrance the illness of relatives ought to be avoided.

" Laennec relates a very remarkable history, showing the influence of mental depression on the production of consumption. He had under his own eye for ten years a religious association of women; the rules of which were extremely severe. The diet of these persons was very austere, yet by no means beyond what nature could bear; but the ascetic spirit which regulated their minds was such as to give rise to the most serious and surprising consequences. Their attention was habitually fixed on the most terrible truths of religion, and they were constantly tried by every kind of contrariety and opposition, in order to bring them, as soon as possible, to an entire renouncement of their own proper will. The consequence of this discipline was the same in all. In the course of a few months consumption appeared. Almost all those, who, by Laennec's advice, left the establishment as soon as the symptoms showed themselves, were cured, although several of them had exhibited well-marked indications of the disease. During ten years he witnessed the entire renovation of the association two or three times, owing to the successive loss of all its members, except a small number, consisting chiefly of the superior, the gatekeeper, and the sisters who had charge of the garden, kitchen, and infirmary. Laennec goes so far as to say that, in other situations, it has appeared to him that almost all the cases of consumption he met with in individuals not constitutionally predisposed to disease, might be attributed to grief, either very deep or of long continuance."

Fevers, more especially those attended with eruptions on the skin, such as smallpox, scarlet fever, and measles, frequently produce scrofula or consumption.

In these diseases there is a considerable alteration in the condition of the blood; and as newly-formed blood is most liable to produce tubercle, they probably act injuriously upon the constitution in this manner. They may either give a tendency to consumption or may excite it in persons already predisposed. Every parent ought to bear in mind this fact, as it frequently happens that the medical attendant is blamed for continuing his visits after the fever has disappeared; and often his attentions are attributed to personal advantage, when in reality they arise from a solicitude for his patient's future safety. Whenever a cough continues for any length of time after these complaints; or, if the patient remains weak and thin; or when, in children, frequent attacks of diarrhœa, or pain in the head or bowels occur; or should enlargement of the glands of the neck be observed medical advice should be sought, as these are often the precursors of more serious illness.

I cannot too strongly reprobate the practice so general in many parts of the country of drenching children with purgative medicines after recovery from these complaints. The popular error which suggests such treatment is, that fevers attended with eruptions leave behind them "dregs" which produce various ailments. The truth is, as I have above stated, that, instead of there being anything in the blood to be removed, too much of the old blood has been already exhausted and its place been supplied with particles of a weaker character. Good diet, therefore, instead of starving, malt liquors instead of purgatives, and fresh air and exercise in place of hot rooms, will be found most beneficial and most in accordance with reason.

I have classed constitution, temperament, age, and fevers, as causes predisposing to scrofula and consumption; we must next turn our attention to those circumstances which are most apt to bring these complaints into activity. It is, of course, difficult to distinguish, in every case, between these two classes of causes: as a predisposing cause, if long continued or if applied in sufficient intensity, may, of itself, excite a disease; and, on the other hand, some of these circumstances we are in the habit of considering as only able to bring into action the dormant dispositions, may be able to produce it altogether.

A deficiency of proper food very often acts as an exciting cause to scrofula and consumption. Thus, in prisons which receive convicts who have been in confinement in different parts of the country, those are found to suffer more from these diseases who have been formerly fed in the most sparing manner. It has often happened that scrofula has appeared in the inmates of an establishment, and that they have been rapidly cured by a change to a more wholesome diet. Where deficiency of food is conjoined with a want of fresh air, as in many of the manufacturing towns of this country, scrofula and consumption are exceedingly common.

There has been much discussion whether any peculiarity in the nature of the food is sufficient to produce these complaints; and there seems some reason to suppose that the want of fatty matter has an injurious tendency. Many have affirmed that the abuse of spirituous liquors produces consumption; whilst others have declared the contrary. The truth appears to be that the liver and nervous system are the parts which suffer in the unhappy drunkard; but that a tendency to consumption is not amongst the long catalogue of his punishments.

It has been supposed that children brought up by hand often become scrofulous, and a little consideration will show that there is a good deal of reason in the observation. The blood receives its nourishment from the food taken into the stomach; and nature, no doubt, supplied milk as best fitted for that purpose for children. If, therefore, we pretend to be wiser than the maker of our bodies, and act in contradiction to what has been ordered, we must expect to suffer for it. Whenever, therefore, a mother is healthy, and has a sufficient supply of milk, it is better a child should be kept to the breast; and when the mother is not in a proper condition to nurse a wet nurse should, if possible, be obtained.

It has frequently been discussed whether a nurse of a scrofulous temperament, but apparently in good health, could transmit the complaint to a child born of healthy parents. The conclusion generally arrived at is that this is not the case, but that a nurse, in any way unhealthy, may prove injurious to a child by supplying it with an improper species of food.

If a deficiency of food be an exciting cause of consumption, a want of pure air is a still more frequent source of the disease. Everyone admits the necessity of proper diet to sustain health, but few reflect upon the great importance of air to the well-being of the body. Not only does the act of breathing free the blood of a large quantity of poisonous gas, but it also produces other changes essential to the carrying on of life. Unlike a deficiency of food, the want of air causes no craving or uneasiness in the frame; so that men forget its necessity, and bring on disease by over-crowding in dwelling-houses, factories, and places of public amusement. It is probably from this reason that so much of the mortality from consumption is to be found in the manufacturing districts of this country. When we find people working at their trades in crowded apartments in the daytime, sleeping in small confined rooms in which every crevice is stopped to shut out the cold, and subject too often to the effects of deficient or improper nourishment, it is not surprising that the returns of the Registrar-General show a vast number of adults cut off by consumption, and of children swept away by water on the brain and convulsions. The following striking instance occurred in the practice of Dr. Arnott. In a school at Norwood, containing 600 boys, scrofula was exceedingly prevalent, and great mortality occurred, which was attributed to bad or insufficient diet. Upon investigation, however, the diet was found to be good, but the ventilation of the school extremely defective. This was properly remedied, and the disease rapidly disappeared.

The effect of an impure or insufficiently renewed atmosphere is shown by the great mortality in prisons and barracks. In the Millbank Penitentiary nearly half of the deaths and half of the pardons were due to scrofula or consumption. During one year the mortality from these diseases, in proportion to the population of the prison, was estimated at nearly four times more than the ordinary rate of mortality in the metropolis from the same complaints.

According to Colonel Tullock's statistics, drawn from the War-Office returns, the deaths from consumption amongst the troops stationed at home bear the proportion of about two to one of the general population at the same ages; and, having shown that this excess is not attributable to cold or other atmospheric influences, or the abuse of spirituous liquors, Colonel Tullock is of opinion that the crowding together of a number of men in barracks has a great effect in producing this complaint.

Persons who are very particular about the ventilation of their rooms during the daytime, often neglect it during the hours of night. They forget that eight or nine hours, spent in small confined rooms, or in beds surrounded by curtains, must produce effects as prejudicial to the health as if they were living for the same length of time in close rooms in the day. Doubtless much of the scrofula and consumption prevalent in the country districts is excited in this way; the labouring population being usually much crowded in their small and often damp cottages.

As the advantages to be derived from pure air arise from its being taken into the chest of the individual, it is evident that any cause lessening the motion of the lungs must produce injurious effects. It is, perhaps, partly in this way that mental anxiety acts in the bringing on of disease, as everyone is aware of the feeling of oppression accompanying this state of the mind. The natural method of increasing the ordinary breathing is by exercise; for when the muscles of the body are put into rapid or violent motion, the blood is forced more quickly through the lungs and the air is more freely inspired for its purification. Thus we observe, that when a person has been using violent exertion his chest heaves rapidly, and the efforts at breathing are deep and laborious. In children nothing is more necessary than attention to regular exercise; and ill health is often produced from the wish of the parents to curb the boisterous spirits which are natural to that period of life. The following striking instance of the result of sedentary habits producing scrofula is given by Mr. Carmichael. In a parochial school where there were twenty-four girls, in every respect well fed, clothed, and lodged, seven of the number, in the summer of 1809, became affected with scrofula, although not one had the disease when admitted. On the most minute inquiry there was not any reason to attribute the prevalence of the disease among them to any deficiency of diet; but during the preceding winter and spring a very small yard, their only playground, had been flooded, and the mistress of the school had received directions to keep the children perpetually within doors, which deprived them of the little exercise they had been accustomed to have. In a short time from the commencement of this sedentary life scrofula began to make its appearance; and afterwards affected nearly a third of their number. Yet, before this privation of exercise, not one was affected with the disease; although, at that period, they were treated so indifferently in respect of diet, that the woman who then superintended them was afterwards dismissed from her situation on account of the bad quality of the provisions she supplied for their use. Her total inattention allowed them the liberty of playing and exercising as they chose; and to this circumstance, Mr. Carmichael remarks, they owed their health; for they made such a good use of their liberty that not one of them showed the slightest symptom of scrofula until they were some months accustomed to confinement. In another school, there were thirty girls fed in the best possible manner; but out of this number there were, in the summer of 1809, six badly affected with scrofula, although when admitted there was not one. The true sources of the disease were found to be the want of a yard or playground, and the children being obliged to remain in the school or their bedroom during play-hours.

It might be expected that want of exercise, if it has a tendency to produce scrofula, would be apt to bring on consumption; and a striking illustration of this fact is recorded by Dr. Guy. He found, in the close workshops of a printing establishment, the compositors, whose employment is sedentary, fell victims to consumption in the proportion of 44 per cent. to 31 per cent. of the pressmen, who, though breathing the same air, and, in every other respect, accustomed to the same habits of life, differ only in the active bodily exercise of the press; and, among the same class of operatives, the deaths from the same cause did not exceed 25 per cent. in those who had exercise in the open air.

There is a popular belief that consumption is frequently produced by the complaint called a cold. This common affection consists in a slight inflammation of the membrane of the nose and windpipe, produced by the sudden checking of perspiration, or by the application of cold to the surface of the body. It is evident, therefore, that of itself it is unable to produce the complaint; but where tubercular disease exists in the lung, an ordinary cold may bring it into activity. In such cases it will usually be found, that for some months or weeks before the appearance of the symptoms, morning cough and general weakness had existed.

In like manner, attacks of simple bronchitis do not seem able to produce consumption, unless where there has been a previous tendency to it. Influenza is a complaint of the blood, as much as fever or measles, producing inflammation of the air passages; and it has always been observed that, after epidemics of this kind, consumption has been very prevalent.

It is of the utmost importance to ascertain whether the occupation in which a person may be engaged has any influence in producing a disease. In this country the great mass of the community is actively employed in trades of different descriptions; and if any of them is liable to bring on a serious disorder, great benefit must be derived by such a fact being widely known, and the means of prevention pointed out. We shall best learn the effects of trades in producing consumption, by examining the returns of hospitals especially devoted to its treatment. I have, therefore, introduced the following table, which shows the occupations of 4358 patients of the hospital at Brompton, between the years 1842 and 1848.

MALES—Total 2679.

In-door Occupations.		Out-door Occupations.		Mixed.	
Clerks, Warehousemen, and Shopmen	314	Labourers of various kinds	490	Carpenters	120
Mechanics	270	Coachmen and Cabmen	109	Painters and Glaziers	73
Servants	237	Butchers	15		
Tailors	192	Various occupations	184		
Shoemakers	127				
Printers and Compositors	104				
Weavers and Glovers	22				
Bakers	45				
Various	146				
No occupation, or under 15 years	234				
Total, in-door	1688	Total, out-door	798	Total, mixed	193

FEMALES—Total 1679.

In-door Occupations.		Out-door Occupations.		Mixed.	
Servants, or persons engaged in in-door occupations	836	None.		None.	
Milliners, Dressmakers, Needlewomen, and Straw-bonnet Makers	312				
Laundresses	82				
Governesses	10				
No occupation, or under 15 years	439				
Total, in-door	1679				

It will be seen by the foregoing table how large a proportion of the male patients have followed in-door employments; and whilst nearly 2000 females have been treated for consumption who gained their livelihood by in-door trades, none of those who worked in the open air had applied to the hospital for relief.

In a report, published in 1852, the above statements are confirmed, consumption being shown to be five times as frequent in persons engaged within doors as in those following more active pursuits. Those whose occupations are most sedentary, viz., dressmakers, needlewomen, tailors, shoemakers, and printers, supplied 167 out of 1000, or one sixth of the whole; and carpenters formed one twentieth of the whole. Clerks also figure very conspicuously in the list, and might be brought forward as further evidence of the connection of consumption with sedentary habits. Hawkers, policemen, and gardeners, all of whom must be continually exposed to the weather, and therefore might be imagined peculiarly liable to such a complaint, present only 20 cases out of the 1000; whilst coachmen, cabmen, grooms, &c., who are a very numerous class in London, and who live in general under circumstances highly prejudicial to health, are, comparatively, seldom consumptive.

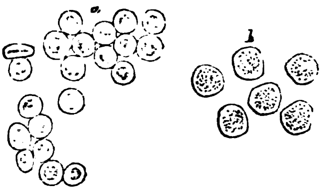
If these were the results of investigations in the metropolis of England alone, some doubts might be entertained as to their correctness, when applied to the world at large; but it has been found in Paris, Geneva, Vienna, and Hamburgh, that there are a greater number of persons following sedentary occupations afflicted with consumption, than those leading an active life, in the proportion of 141 to 89.

From an investigation of the books of King's College, London, it appears, that labouring men and tradesmen, under forty years of age, are twice as liable as the class of gentry; and that the ratio of deaths from consumption to the deaths from all other diseases, in those who follow in-door and out-door occupations, are as 1 to 2 and 1 to 2½.

It will be observed that there is nothing in the above trades necessarily producing consumption; but that their ill effects arise from the circumstances under which they are carried on. For instance, if a London shopman could follow his occupation in the open air, instead of in a heated or crowded room, he would not be in danger. It cannot be a matter of surprise to anyone who knows the manner in which many trades are conducted, and who has read in the foregoing pages, that a contracted position of the chest, impure air, and want of exercise, are among the chief causes of the disease, that it is so general in the large cities of this and other countries. The crowding together of numbers of people, or the confinement of youths, for so many continuous hours, in shops, heated with gas, and where ventilation is prevented by the quantity of goods, must prove injurious to the healthiest, and is almost certain to excite consumption in those at all predisposed to it.

In order clearly to understand the effects of the foregoing causes of consumption, it will be necessary to inquire into the nature and healthy condition of the blood. When a drop of blood is placed beneath the microscope, a great number of small bodies, termed blood-globules, are observed floating in a thickish but transparent fluid. Two different kinds of globules can be distinguished, the most numerous being of a red colour, and of a circular flattened shape, like a piece of money, varying in diameter from one three-thousandth to one four-thousandth part of an inch. The other kind is much less numerous, there being, in a state of health, only one to fifty of the red globules. They are nearly round, and about one two-thousand-five-hundredth part of an inch in diameter.

Fig. 11.



Blood-globules, highly magnified.

a marks the red globules, and *b* the white ones.

The exact uses performed by these minute bodies are not accurately known; but it is probable that, besides carrying the air to different parts of the body, they prepare the fluid part of the blood for the nourishment of the various structures. Sufficient, however, is known to prove that their presence is essential to the continuance of life; and a redness of the face and lips, arising from a large quantity of the red blood-globules, is popularly considered as a sign of robust health, whereas the pale condition of the skin, which may be observed when they are deficient, is always associated with bodily weakness.

As is the case with the solid parts of the body there is a continual destruction and reproduction of the particles of the blood. The red globules, after fulfilling their allotted period of existence, gradually disappear by solution in the fluid in which they swim; whilst the white globules, before described, are changed into the red ones. These white globules, which are, therefore, the immature red ones, are originally formed in the lymphatic vessels I before described as receiving the contents of the blood-vessels; and their change into the red globules appears to be produced chiefly by the action of the lungs.

It will, therefore, be easily understood that as the fluid part of the blood depends for the continuance of its proper constitution upon the nature of the food digested in the stomach, a deficiency or improper kind of diet will be likely to derange the health, and so give rise to the formation of tubercle.

It will be also seen, that, as the changes from the white to the red globules of the blood seem to depend greatly upon breathing, the absence of pure air, whether this arise from atmospheric impurity, from want of exercise, or from a stooping posture—preventing the free admission of air to the lungs—must produce the same result.

CHAPTER V.

Any means we may use for the prevention of a disease must necessarily depend upon our knowledge of the circumstances causing it; and the remarks in this chapter are, therefore, connected with those in the preceding one. It was before shown that females are rather more liable to consumption than males; and parents whose families have a tendency to this disease, ought to watch, with especial solicitude, over the health of their female children; encouraging them to be, as much as possible, in the open air, and to play without the restraint that is so frequently imposed upon them. Crowded schools and crowded bedrooms should not be allowed. The influence of impure air in producing the disease having been already explained, the motions of the chest should be left as free as possible, and long-continued sitting in a stooping posture, as we see children apt to do when drawing or writing, must not be permitted. Tight or stiff stays should never be used, as they produce the same injurious effects.

As the tendency to consumption and scrofulous complaints does not materially diminish until fifty years of age, patient and persevering attention to the general health must be continued until that period. At certain ages, however, in each family, there is usually a greater tendency to some form of the disease, and, where this has been observed the utmost care should be used in watching for the first symptoms of the complaint.

As an instance of this, I lately saw a child who had already begun to show symptoms of scrofulous disease in the brain, which complaint had previously carried off, about the same age, every other child of the family. I may here, perhaps, with advantage, repeat what was before said, that tubercle is most frequently deposited in the brain in children under five years of age, and in the glands of the bowels in those under ten years; whilst the lungs more frequently suffer in persons from twenty to forty.

Whilst every precaution is taken to avoid consumption, all despondency on the part of the person liable to it, must, if possible, be dispelled. He should be taught to look upon the complaint as one to be avoided; but he should never allow the dread of it to weigh upon his mind or depress his spirits. The present work is not intended tò act upon the fears of such a person, and drive him, unnecessarily, into the hands of the profession; but to teach him how to avoid disease. I must remind my reader that, however strong the predisposition to consumption may be in any individual, there is no certainty that he will be affected by it; but, that many, from believing that they are sure to die of it, become desponding, and thereby invite its attacks. One of the healthiest men I ever knew, and who lived to an old age, was the only survivor of a family which had been cut off by consumption; but, in his youth, he had been placed under different and more favorable circumstances than the others, and had thereby escaped their fate. It is not uncommon, among the poorer classes of society, for a person to suggest to a friend who may happen to have a cough, that "it sounds like consumption." Nothing can be more prejudicial or cruel than to alarm the patient by such remarks; as, without an examination of the chest, the existence of the disease cannot possibly be ascertained. I draw attention to this, because it so frequently takes place, and, consequently, few medical practitioners are, for any length of time, without patients whose only disorder consists in fear.

There is a subject of vast practical importance which appears never to have obtained the notice it deserves from popular writers upon health or disease. I refer to marriage, which, it will be seen by a former chapter, when contracted by persons unfitted for it, produces an immense amount of misery from ill health. It is usually considered a question only of the happiness of the individuals entering into it;

and it seems to be forgotten that the health and happiness of future generations are also dependent upon it. Scrofula, consumption, gout, rheumatism, and many other disorders, appear to be regularly transmitted from the parents to the children; and, with them, pain, misery, and often poverty. It has been said by Lugol, and the remark is founded upon observation, that scrofula, along with its attendant diseases, can be eradicated in three generations, if the individual, in each case, marries a healthy person. In the East Indies it is considered that seven generations are requisite to enable a person to lose the peculiarities of his caste. Whichever of these be correct, it is pretty certain that a person of a consumptive family marrying into one that is perfectly healthy, will have children less liable to consumption than himself; and if the children and their successors are equally careful, the tendency to the complaint will be lost. There is, therefore, great responsibility attached to every member of a consumptive or scrofulous family, that he should not perpetuate a disease that sweeps away one fifth of the human race. It is the more important that such considerations should be impressed upon non-professional persons, because, in the majority of cases, the medical adviser of the family is not consulted until matters have gone so far that the happiness of one or both of the parties concerned may be irreparably injured by breaking off the engagement.

The following rules may be useful. A person of a consumptive or scrofulous family, should not marry one whose family has been in like manner affected. The intermarriage of members of the same family, where these diseases have shown themselves, is of course doubly dangerous. Marriage ought not to be allowed when either of the parties is suffering from any symptom of these diseases. Marriages at a very early age, even when the subjects are healthy, should be avoided; and the same rule holds good with respect to marriages made too late in life. There has been much discussion as to the earliest age at which marriage should be contracted; but as a general rule, we may fix it at twenty years for women, and twenty-four or twenty-five for men.

As it was before stated that improper diet was apt to produce a diseased condition of the blood, it will be necessary now to draw attention to this point. Nothing is more productive of disease than the bringing up of children by hand. In case a mother is unable to nurse, a wet nurse should if possible be substituted. Where a mother is unhealthy or suffering from any form of scrofula or consumption, she ought not to nurse her child even if she is able to do so. For the first five or six months a child predisposed to these complaints should have no other food than the breast milk; but on the other hand, too long nursing should be avoided, and it should as a general rule be weaned at ten or twelve months.

After weaning, great attention should be paid to the diet of children predisposed to these complaints. Small quantities of animal food may be allowed daily, and care ought to be taken that they are not hurried at their meals, but that they thoroughly masticate their food. In older persons the diet should be good and nourishing, but it is not advisable for those predisposed to disease to confine themselves to any particular kind of food if the powers of digestion be good. Fat has been strongly recommended; and many observers have remarked that consumption is rare among butchers both in England and France. Malt liquors in moderation are generally considered beneficial, but intemperance in the use of stimulating drinks must be carefully avoided.

It has been frequently conjectured that a deficiency of fatty food tended to produce scrofula and consumption; and the use of a diet of this kind has been therefore often recommended to those liable to these diseases. Dr. Simpson, of Edinburgh, has lately brought this view more prominently into notice, and has proposed the external application of oil. He was led to investigate this subject by having his attention accidentally directed to it when on a visit to Galashiels, in Roxburghshire; he there remarked the healthy and robust appearance of the workmen in the woollen manufactories, and was informed that they were strikingly exempt from scrofula and consumption; an exemption which they themselves attributed to the effects of the oil which in the course of their daily labour is freely applied to the skin.

From inquiries which Dr. Simpson instituted, he ascertained that the operatives in the other large woollen factories in Scotland were also unusually free from these diseases; and that their state of health appeared to depend upon the more or less oily nature of their employment; that they generally improved in appearance when working at the more oily processes, and often lost flesh and strength in a marked manner after leaving them.

Although we have not sufficient evidence to show of what value the application of oil to the skin may be in the prevention of these complaints, its usefulness seems so probable, that I have appended the rules given by Dr. Simpson.

"1. The oil selected ought to be bland and inodorous, like olive or salad oil, and it should be applied moderately warm. Its application is thus rendered far more agreeable to the feelings of the patient: the danger of chills is avoided, and the act of absorption is increased by an elevated temperature. 2. A considerable amount and duration of friction should be used either by the patient or his attendant, or by both, in order to rub in the oil as much as possible, and thus promote the completeness of its absorption. 3. The oil and friction should be applied to the whole cutaneous surface of the trunk and extremities, but especially to those parts of it where the skin is thin and the function of absorption greatest, as the sides, the flexures of the limbs, the insides of the thighs, &c. 4. The average quantity of oil requiring to be used at each inunction is about a large wine-glassful. 5. In cases in which it is an important object to introduce the oil into the system as freely and rapidly as possible, the inunction of it may be practised twice or oftener in twenty-four hours, especially with children; but the best time for a single daily oil inunction is immediately before retiring to bed, as the imbibition of any free oil left on the surface may afterwards go on during the night; and to save the bed-clothes, the patient should sleep in a dress of flannel, linen, or other material that stretches beyond the feet. 6. In order to maintain the full absorbing action of the skin in conjunction with the practice of oil inunction, occasional warm sponging or bathing of the whole cutaneous surface with tepid water, or with a weak solution of soda and water should be employed, either immediately before an inunction, or several hours subsequently to one. 7. It is to be remembered that the cutaneous absorption of oil is usually, though not always, comparatively more slow and difficult, and hence the practice itself is so far more disagreeable for two or three weeks after the inunction is first begun than subsequently; and consequently that less oil disappears, and more friction is required in the beginning of the practice than afterwards."

The most important matter in the prevention of these diseases is to surround those predisposed to them with a constant supply of fresh air. This is a point little understood and very much neglected; but its importance will be recognised by anyone who has read the foregoing chapter. In order to effect this object, it is necessary that the house be selected with some care. I know that most of my poorer readers will not have it in their power to follow out these instructions; but still they may gain some hints which will be useful in the choice of their houses.

The dwelling houses of persons predisposed to scrofula and consumption should if possible be in the country, but not surrounded by trees, as they both attract and retain moisture, and thus increase the dampness. If in the town, they should be situated in a wide and airy street. They should have a southerly or westerly aspect; the bedrooms, especially, should look in this direction. Some medical writers lay great stress upon this point, and quote the following illustration of the effects of aspect upon health from Dr. Young's work on Consumption.

" One of the most open and exposed of the buildings on Clifton Hill is Richmond Terrace, which forms a parallelogram, from respectively, the East, South, and West; on the east side not one family, and scarcely an individual, escaped influenza, in 1803; while on the south side a great majority both of persons and families, in all other respects similarly situated, escaped it entirely."

The most desirable site for a house is an elevated situation on a dry soil, with many windows, so as to ensure a sufficient supply of light and air.

As so large a portion of time is spent by everyone in sleep, it is advisable that the rooms appropriated to this purpose should be large and airy. There is no greater mistake, and no greater proof of the popular ignorance of matters concerning health, than the prevalent habit of setting apart the largest room for the purpose of display, and cramming the family into small and confined sleeping apartments. Nurses should also be cautioned never to allow children to sleep with the head under the bedclothes, as to this habit a pathologist of considerable note has attributed the production of scrofula.

It is most important for the warding off of these diseases, that regular exercise should be taken in the open air. It is not sufficient, in order to obtain the benefit of exercise, that a person be actively employed in the house on domestic affairs; as the standing or moving about in the confined air of a room does not produce the same effect.

Children should be encouraged to play, as much as possible, out of doors, and their recreation should never be restricted to a formal daily walk. When in the house, the ordinary games, such as rocking, swinging, or those games that exercise the arms and chest are exceedingly useful. For adults, I believe riding, where this kind of exercise can be taken, is one of the most beneficial; and is of so much value that it has been even proposed as a cure for consumption. When confined in the house, adults will find benefit from the use of the elastic chest-expander, or from light dumbbells, or from the club exercise. I have seen nothing, however, more useful to persons predisposed to consumption than travelling once or twice a year. By travelling must be understood, the passing quietly from place to place, and not the hurrying in excursion trains through large tracts of country for a few days, nor the journey to some fashionable watering place.

It is a popular error to suppose that a consumptive person can be "hardened" by exposure to cold, or by the use of insufficient clothing. Those predisposed to consumption have usually less power of resisting cold than others, and it is therefore advisable that proper precautions should be taken against becoming chilled. When children are delicate this is more particularly to be considered, as the fashions of the day often prescribe a kind of dress insufficient to protect them from the effects of our uncertain climate. As a general rule, persons predisposed to these complaints should wear flannel or some similar material next the skin; and in children the legs ought not to be allowed to be so much uncovered as is often the case.

From what was explained in the last chapter, parents of consumptive families will be able to select those trades that are least likely to be injurious to their children. In the first place those must be avoided in which the lungs are exposed to much dust, such as potters, stone-masons, miners, needle-pointers, manufacturers of gun-flints, iron-turners, and others of a similar nature.

Secondly, sedentary occupations are injurious, unless there is opportunity for a good deal of exercise in the open air before and after the hours of business. Thirdly, those are injurious in which large numbers are crowded together, as in many of the tailor's shops in the metropolis.

I have, in this chapter, laid down rules which, although they may be readily understood by all, may nevertheless, in some cases, be difficult of application; but if the principles upon which they are founded be remembered, the poorest of my readers will be able to gather hints from them. It is well known, that in diet, clothing, and ventilation of houses, great improvements have taken place in the condition of our population within the last two or three centuries; and it will be interesting to ascertain whether they have produced any corresponding decrease in the prevalence of the diseases we have been considering. Mr. Phillips estimates the numbers of those who resorted to the Royal touch for scrofula, in the reign of Charles the Second, as amounting to about 20,000 in London, or about 1 in 30 of the population;

whereas, in the present day, not more than 1 in 100 is affected with scrofula.

The following interesting table, which shows how much consumption has decreased in London during the last 150 years, I have extracted from the valuable work of Mr. Ancell:

Period.	Population.	Number of Deaths from Consumption.	Yearly Deaths per 100 living from Consumption.
1700	665,200	3055	4·
1750	653,900	4373	6·66
1801	777,000	4979	6·
1811	888,000	5491	6·17
1821	1,050,500	6552	6·2
1831	1,233,000	4735	3·8
1841	1,948,369	7326	3·7
1847	2,143,055	7010	3·2
1849	2,206,076	6317	2·8
1850	2,240,289	6137	2·7
1851	2,373,799	7027	2·9

The decrease which is here shown in the prevalence of these fatal diseases, encourages the hope that, when a better knowledge of their causes is more generally diffused, they will still further decline in frequency; and it shows, also, that such information should not be confined to the medical profession, but become the possession of the community at large.

CHAPTER VI.

A CHANGE of climate is one of the most valuable means in our power for warding off the attacks of scrofula and consumption from those predisposed to these diseases. The popular impression is, that any benefit an invalid may derive from change of locality arises from an alteration in the air that he breathes. This is to a certain extent true; for a change of air may include a very considerable difference in the composition, weight, and humidity of the atmosphere, or perhaps a protection from certain winds which might prove injurious to him; but, in addition to these, the alteration in the amount of solar light and heat, the different kinds of soil and water, and the change of diet, clothing, exercise, and general habits, consequent on a change of climate, are all matters of considerable importance to the invalid. When we also remember that a person residing at a distance from his home is usually more free from the ordinary cares and anxieties of life, we need not feel surprised that the most powerful and beneficial effects are often experienced.

This subject is one of peculiar interest and value to the inhabitants of these islands, for our extensive colonial dependencies, and the facility with which they can now be reached, render emigration to a milder climate moderately easy. It is, therefore, worthy of the consideration of those whose families have evinced a strong predisposition to consumption, whether it may not be advisable for them to seek in a foreign land that immunity from this disease which they cannot hope to obtain in their own country. It must be also remembered that many who here would be condemned to the close confinement of a shop or desk, would be able to gain their livelihood by folfowing a more active and healthful occupation when abroad.

Even after consumption has commenced, the change to a milder air often acts in a most beneficial manner, and has been long considered one of the most useful remedies for this disease. In such cases the chief benefit consists in the prevention of those attacks of inflammation which are so often produced by the atmospheric changes of our uncertain climate, and which destroy the tissues of the lung in the vicinity of the tubercle.

It is easy to understand that the change from an unhealthy place must at all times prove beneficial. When, for instance, a person living in the close unhealthy streets and crowded houses of a large town, or who has been injured by too close confinement to ousiness, is removed to a locality where he can enjoy resh air and a freedom from cares, it is reasonable o expect that any symptoms of disease from which he may suffer will be ameliorated. But from change of limate more than this is expected by the patient iable to or affected by consumption; and the prevalent dea is that he is to be sent to some place where the isease does not attack the human race. It will be ecessary, therefore, to ascertain if this opinion be orrect.

Patients in this country are usually ordered to Madeira, Italy, or the south of France. Now what s the condition of the inhabitants of these countries ith regard to consumption? The following quotaion answers the question most decisively; and proves hat no immunity against this disease is to be there ound.

"Taking the more southern part of this region, the countries to which tuberculous invalids are expatriated n search of health, we find the disease nearly, if not uite, as frequent as in the more northern. In the Mediterranean Archipelago, consumption makes great ravages. In Malta, 5⅛ per 1000 of the whole population die annually of disease of the lungs. Of 51 deaths out of 813 patients, at the Royal Naval Hospital, 17, or one third, were from consumption. In Spain, scrofula is endemic, and consumption very frequent. Amongst the civil inhabitants of Gibralter, it is as frequent as amongst the military. At Madrid both are extremely frequent. In Greece and Turkey consumption is very common; scrofula is remarkably frequent in Greece. In Italy, consumption is as common as in France. In Naples, 1 death in 8 is produced by it. Nice has a deeply scrofulous population; and consumption is very common. According to Dr. Burges, in his work on Climate, recently published, there is no part of France where consumption is so prevalent, amongst the native population, as in Montpellier and Marseilles; in the latter, especially, its ravages amongst youth are very great. In Italy, Dr. Burges confirms its prevalency. In Venice and Geneva it is amongst the most frequent diseases. According to Dr. Merryon, at Nice more natives die of consumption than in any town in England of the same amount of population; and the bills of mortality give 1 in 7 of the deaths from consumption." *

Although a person predisposed to or suffering from consumption, will thus find it almost impossible to select a country in which he will not meet with some of its inhabitants similarly affected, yet we continually see the greatest possible benefit derived from a residence abroad. Much of the frequency of this disease, in any of the countries above mentioned, may be attributed to the habits of the poorer classes, amongst whom it is chiefly prevalent. In Madeira, for instance, Dr. Renton "admits that consumption,

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* Ancell on 'Tuberculosis,' page 522.

à priori, might have been expected, and he directs attention to the fact that the lower classes are remarkably exposed to the ordinary causes of the disease, their food consisting of crude vegetables and hard salted fish; they are badly clothed; their habitations are low miserable huts; and their beds consist of pellets of straw, raised a foot or two from the ground, which is damp during nine months of the year."* It is evident, from the above statements, that any climate is unable to prevent consumption or scrofula, where the other conditions which are known to produce it are present; but if these conditions are removed, there is no doubt that the climate of many countries is more fit for persons predisposed to or suffering from these diseases than our own.

The chief advantages which an invalid may expect to derive from change to a warmer atmosphere, are the escape from the cold winds which prevail in this country during the winter and spring; and the power of being able to take exercise, out of doors, at all seasons of the year. But it will be evident that no benefit can be expected from this remedy for persons in the last stage of consumption, when their strength is so much reduced as to prevent exertion, and when the night sweats or diarrhœa are so severe as to confine them principally to their beds.

It is in the earlier stages of the disease, or when the progress of the complaint has been checked by treatment; or, still more, before the tubercle has actually been deposited in the lung, that real benefit can be hoped for from change of climate; but whenever a patient leaves his home in search of health, he must remember that there is no mysterious influence in the air of any country he may choose; but that his recovery will depend upon his freedom from anxiety; his attention to diet and clothing; and, above all, upon the amount of gentle exercise which he is able to take out of doors.

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* Sir James Clark on 'Climate,' page 279.

The following quotation from Mr. Ancell will show that the above opinions are not peculiar to myself, but are those generally held by the medical profession at large.

"During the last few years I have known several tuberculous individuals, who have been to Madeira and returned with their health comparatively restored; but, on questioning them, I find that they have lived twice or thrice as much in the open air as they were were accustomed to do during corresponding seasons at home. They have also taken infinitely more exercise, and that of a gentle and salutary kind; they have been relieved of many of the harassing cares of life; and they have followed out judicious instruction as to their diet and general habits. I have been informed of others, who have gone there under equally promising circumstances, but have fallen into irregularity or dissipation; have adopted the converse of these hygienic rules; and have not only received no benefit, but their disease has progressed even more rapidly than if they had remained at home."

It is evident that the most important matter respecting climate, in cases of disease of the lung, is the choice of a residence for the autumn and winter months. In attempting to give a condensed account of the best medical opinions upon this subject, I shall chiefly have recourse to the work I have last quoted, and to the writings of Sir James Clark.

Madeira is the most celebrated of foreign climates, and has perhaps proved most useful, more especially in cases threatening consumption. The following account of it will be therefore interesting and valuable to my readers.

"*Madeira.*—The minute and careful observations of the late Dr. Heineker and of Dr. Renton, for a series of years, have afforded us sufficient data to form an accurate estimate of the climate of this island; and, although our materials for enabling us to judge of the other Atlantic islands are much less complete, they leave little doubt in our minds that Madeira is superior to any of them; while it affords conveniences, in other respects, as a residence for invalids, possessed by none of them. The height of the central ridge of mountains, which compose the greater part of this island, although it may detract somewhat from its warmth during the winter, contributes greatly to temper the heat of its summer. It gives Madeira the advantage of a cool land breeze during the night, which, alternating with a refreshing sea breeze in the day, moderates the summer heat in a very material degree, while the trade winds, which prevail at this season, in the latitude of Madeira, contribute also to its coolness and salubrity. The invalid, moreover, by choosing for his summer residence an elevated situation in the interior, finds a climate considerably cooler than that of Funchal, which is situated on the sea shore, and affords the best winter residence.

"Comparing Madeira with the south-east of France and Italy, we find that, although its mean annual temperature is only about six degrees higher than that of these places, this temperature is very differently distributed throughout the year, the range being far less at Madeira than in the most favoured spots in the south of Europe. Thus, while the winter is twelve degrees warmer than in Italy and France, the summer is five degrees *cooler;* and, while the mean annual range at Madeira is only fourteen degrees, it is nearly double this at Pisa, Rome, Naples, and Nice. In the equable distribution of heat throughout the year, it possesses a similar superiority over the same places. For example, while the mean difference of temperature of successive months at Madeira is only two degrees, at Rome and Nice it is four, and at Pisa and Naples five degrees.

"In the progression of temperature during the day it maintains the same superiority; the mean range for twenty-four hours being ten degrees by the *register* thermometer; while at Nice it is nine degrees, at Rome ten degrees, and at Naples thirteen degrees, by the common thermometer. In steadiness of temperature, day by day (a very important quality in a climate), Madeira excels all those places greatly. There is also a considerable difference in respect to the dryness of the two climates. Nearly the same quantity of rain falls at Madeira as at Rome; but there are only seventy-three days in which any rain falls, while at Rome there are one hundred and seventeen days. The rain at Madeira, also, falls at more regular seasons, chiefly in the autumn, the atmosphere being generally dry and clear for the remainder of the year. The annual range of the atmospheric pressure is very small, which is the case also at Rome and Naples.

"From this comparison the superiority of the climate of Madeira over that of the south of Europe will be at once seen. We shall have occasion hereafter to notice their comparative influence on disease."

"*Montpellier.*—This place has now so completely lost the character which it once possessed of a mild climate, that it may suffice to remark here, that a more improper residence could scarcely be selected for a person disposed to pulmonary disease. Its high exposed situation renders it liable to all the evils of this climate in a remarkable degree; and it is, moreover, well ascertained, that pulmonary inflammation and consumption are among the most prevailing diseases of the place."

"*Marseilles.*—Although less exposed than Montpellier, this is an equally improper residence for consumptive invalids; from the manner in which the environs of Marseilles are divided into small properties, surrounded by high walls, the invalid has no means of taking proper exercise, or of breathing country air; and without these a consumptive invalid can derive little advantage from any climate."

"*Italy.*—The only places which we consider deserving of notice as winter climates in Italy, are Pisa, Rome, and Naples."

"The climates of Pisa and Rome resemble each other in their general qualities.

"Rome is somewhat warmer in the winter, it is also dryer than Pisa, though more humid than Nice, and the parching climate of Provence. About one third more rain falls at Rome than in the latter country, and the number of rainy days is much greater. Taking into account all the qualities of the climate of Rome, we consider it one of the best in Italy. To the invalid capable of taking exercise in the open air it affords advantages over both Naples and Pisa.

"Patients, on the other hand, who can bear little exposure to the air, and who must, therefore, confine themselves to the most sheltered situations, will fin in the Lung' Arno, in Pisa, a residence possessing advantages, perhaps, over every other place in Italy." These observations have reference to Italy during the winter and spring, that is from October until May or June.

"*Egypt*, and particularly Upper Egypt, is, perhaps, the best foreign winter climate known for tuberculous invalids. It is moderately warm and equable in temperature; dry and elastic, the sky bright and cloudless, the atmosphere pure, transparent and exhilarating. There is little rain, no frost or snow, and dew is seldom seen. Its greatest defect is the remarkable fall of temperature during the night, rendering care necessary on the part of the invalid to avoid the injurious influence of its chilling effects. It is liable also to wind, vermin, and dust. Clot Bay has seen many persons cured of consumption, who arrived there labouring under the disease, and others materially relieved. Dr. Cumming, who passed a winter in Upper Egypt, advises all persons disposed to consumption, who are liable to catch cold on slight exposure to damp, to resort to the Nile during the winter, but it is not adapted for the invalid whose disease is far advanced."

There has been, of late years, a general opinion amongst the medical profession, that whatever advantages are to be derived from change of climate may be found in some of the more sheltered spots in our own island; and I shall, therefore, next describe two or three of the localities principally resorted to during the colder months of the year by invalids affected with disease of the lungs.

"Dr. Martin is the latest author who has described, in the most favorable terms, the beneficial effects of the Undercliff, Isle of Wight, as a winter residence in cases of tuberculosis, during the earlier stages and in the more curable forms of the disease. The advantages of this locality are derived from its *south-easterly aspect;* owing to which, during the whole winter, the rays of the sun from rising to setting are upon it; its *inclination,* which allows the sun's rays to fall at a less oblique angle than on a plane surface, thereby rendering it warmer; the *reflection of heat* from the naked rocks; the *protection* afforded by its heights against the effects of pernicious winds; the *irradiation* of the rays of heat during the winter, from the soil heated during the previous summer; and from the proximity of the British Channel moderating the heat of the summer, and tending by its influence to soften the rigour of the winter season. Under these circumstances, the mean annual temperature is at least 51° 72′; and it is characterised by remarkable *equability*, as respects different years, and also as respects the mean extreme range, in which it has a superiority over Madeira in the winter months; it has also a lower mean successive daily range. The mean atmospheric pressure, also, in a period of ten years, according to Dr. Martin, is somewhat lower than in London or in Devonshire; the extreme annual range is less than in London, and the mean yearly range is less than at Exeter, although the converse is the case as to the mean monthly range. The extreme range of ten years is 2·16 inches, while that of London is 2·40 inches.

"The Undercliff, in consequence of the dryness of its soil and good drainage, is dryer than most marine climates of a similar character. The usual amount of rain-fall is less; the rocks to the North attract the clouds, and favour the descent of rain; the mean annual fall of rain is given at 25·94 inches, varying from that of London a little more than an inch, and the fall for Devonshire being 32·65 inches; more rain falls during the night than in the day; snow does not often fall, nor remain long on the ground, and the quantity is rarely great. South-westerly winds predominate in all seasons of the year; sea-fogs are less prevalent than on most parts of the British coast; it is remarkably free from thunder-storms. Finally, in addition to the above advantages, the Undercliff enjoys the full influence of the solar *light*, particularly during the *winter* season."

"The Undercliff, in fact, presents immense advantages for the tuberculous invalid. It is impossible to do justice to Dr. Martin's description in this work; but I cannot refrain from recommending those of my professional brethren who have not read it, to do so, before they determine on the expatriation of their consumptive patients. It is a climate in which there are few days during the winter in which an invalid may not take *exercise out of doors;* according to the views I entertain and will presently state, I should say almost *none;* and he may do so within a short time after rain has fallen; the extent of sheltered ground for exercise, either walking, riding, or driving, forms a prominent feature in its advantages.

"Dr. Martin states, from experience, that the beneficial effects of this climate in tuberculous affections, as glandular enlargements, diseased joints, scrofulous wounds, necrosis, and phthisis, are annually witnessed; but he does not recommend it as a residence throughout the year; the invalid months are from the beginning of October to the end of June or July; and a change is necessary during the summer and autumn."*

"Hastings is recommended as a winter residence for tuberculous subjects, on account of its mild climate and sheltered situation. Particular parts of the town are very effectually protected from northerly and north-easterly winds. It lies low, and has an atmosphere more completely marine than most other places on the coast, owing to the manner in which it is surrounded by high cliffs. My own experience of it is, that where a marine atmosphere does not disagree, patients are generally very much benefited by spending the winter there, but I have known several instances in which the air appeared to be too stimulating, and pulmonary affections have been aggravated.

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* Ancell on 'Tuberculosis.'

"The climate of the south coasts of Devon and Cornwall will be found very efficacious in soothing an irritated or irritable state of the respiratory organs, and of the mucous surfaces generally; as in chronic inflammation of the fauces, and of the laryngeal, tracheal, and bronchial membrane, of a dry, irritable character, or at least accompanied with little secretion and highly susceptible of increased irritation from sharp dry winds."

PART II.

CLERGYMAN'S SORE THROAT.

CLERGYMAN'S SORE THROAT.

CHAPTER I.

UNLIKE the disease last described, this seldom proves fatal unless complicated with an affection of some other organ: From its great frequency, however, among the better-educated classes, and from its preventing some of the most valuable members of society from being publicly useful, it is a subject of considerable importance. It usually arises from ignorance of the nature of the vocal organs, and as, in most cases, it can be readily avoided, a more general study of this subject is desirable. It is strange, that when the structure and uses of so many other parts of the human body have been minutely pointed out in popular writings, that so little care has been taken to make the non-professional public acquainted with the anatomy of the vocal organs, the knowledge of which is of such great practical importance.

Although, from the name it bears, this complaint might be considered peculiar to the clerical profession, all persons in the habit of using the voice in public are subject to it, such as barristers, singers, lecturers, schoolmasters. Accompanying it, there is usually more or less soreness of the throat and palate, especially after the exertion of speaking. There is also a difference in the tone of the voice, varying from a slight huskiness to an inability to pronounce a word above a whisper. In the majority of cases the sounds are only roughened, and the voice audible, except after long-continued speaking.

Before drawing my reader's attention to the nature of this disease, it will be necessary to make him acquainted with the healthy structure and functions of the different parts employed for the production of the voice. As the more intelligent part of the community is alone liable to the complaint, I shall enter more minutely into anatomical details than I have done in the chapters on consumption.

The upper part of the windpipe, which is termed the larynx, is usually described, in popular works on physiology, as the organ of voice. From this it naturally follows that persons consider attention to this part as all that is requisite for the proper management of their speaking. In reality, however, the larynx is no more the entire organ of voice than the reed-pipes of a church organ are the organ itself, or the strings of a violin the whole instrument. It only forms one part of the apparatus employed by man in speaking or singing, and any neglect or improper use of the other portions required for this purpose is equally injurious.

The different parts of the human frame, used in the production of sound, bear considerable resemblance to a church organ; and, as the structure of this instrument is probably familiar to most of my readers, I will endeavour, by the help of the one, to explain the actions of the other. The principal parts of an organ are the bellows, the windchest, and the pipes; as by these the different sounds are produced, and the keys, drawstops, &c., are merely means of directing the air through the pipes at the will of the musician. The bellows force the air into the windchest, from which it is supplied to the pipes, which are thus enabled to speak. In the human body the chest and lungs correspond to the bellows; the windpipe performs the office of the windchest; whilst the larynx, by a beautiful but complicated structure, performs the offices of the pipes.

It will be necessary to examine the separate parts of the vocal apparatus more in detail, as a proper knowledge of the manner in which they act is of essential importance to those who are interested in the proper management of the voice.

"The bellows of an organ consist of two wooden boards or leaves, which are so connected at the sides, by ribs of wood lying in folds and fastened together at the edges with leather, that they admit of being opened and closed with regard to one another. The under leaf is fastened so as to be immoveable. To the upper or moveable leaf is affixed a lever or handle, which, being pressed down, opens the bellows and sucks in the air. The moveable leaf then returns to its original position by the downward pressure of several weights placed on the top of it; and, in so doing, forces the wind through the trunk into the windchest. In the under leaf of the bellows is inserted a valve, which, as the handle descends, opens inwardly to admit the air, but which immediately closes again so that the wind shall not escape."*

The human bellows is of a different and much more complicated construction. The back part is formed by the spine, a range of bones which can be felt beneath the skin extending along the centre of the back. It is composed of a number of separate bones placed one upon another, and securely jointed together so as to give strength at the same time that free motion is allowed. Connected with the spine on either side are the ribs, which are long moveable bones, joined in front by means of gristle with the breast-bone. In fig. 12 these different parts are shown,—*a* being the spine; *b* being placed upon the ribs, and *c* upon the breast-bone; whilst *d* points out the gristly continuations of the ribs called the cartilages of the ribs. As in the bellows, the air is sucked in by the raising of one of the leaves, so in the human chest

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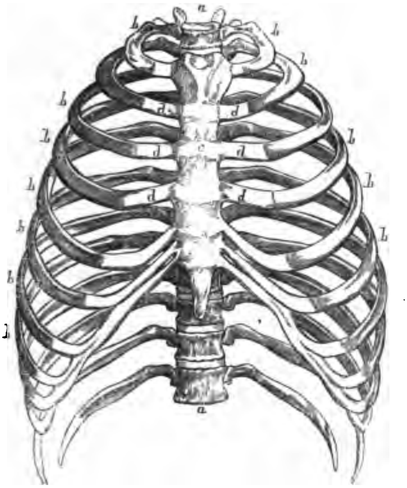
* Hamilton's 'Catechism of the Organ.'

FIG. 12.



A view of the bones and cartilages of the human chest.

a. Bones forming the spine. *b*. The ribs. *c*. The breast-bone. *d*. The cartilages of the ribs.

inspiration is performed by the ribs being raised and separated one from the other. In addition to this, the muscle which separates the chest from the stomach and bowels presses down these organs, and thus still further enlarges the capacity of the lungs. By these combined actions a vacuum is formed in the chest, and the wind rushes in, through the windpipe, to

supply it. Instead of the lever which raises the leaves of the bellows, the motions between the different parts of the chest are effected by muscles placed between the ribs.

The air in the bellows is forced out by the heavy weights placed upon it, and a similar result is obtained in the human subject by the elasticity of the lungs and walls of the chest. The weight from these causes, which has, of course, to be lifted in inspiration, is enormous, and to any one unacquainted with the structure of the chest will appear almost incredible. For instance, Mr. Hutchinson states of a man whom he examined, that "the man, when alive, exerted a muscular power, with the walls of the chest, when he inspired 200 cubic inches of air, equal to a total weight of 451 lb. avoirdupois. Independent of the collapsing elasticity of the lungs, which would not be less than 128 lb. more, his inspiratory muscles lifted a weight of 32 stone; a weight which he could not have lifted with his arms. This man could inhale 300 cubic inches of air, and there is every reason to think, from this extensive mobility, according to our last estimate, that the elastic collapse of his ribs, at the termination of deep inspiration, would be not less than 1000 lb." Even in the mere act of *ordinary* breathing there is an elastic resistance from the ribs and their cartilages, independently of the elastic force of the lungs, equal to more than 100 lb. When we consider that, by the muscles of our chest, we are

lifting this weight eighteen or twenty times every minute of our lives, we may well feel surprise at the admirable adaptation of the different parts of the breathing apparatus, which enables us to raise so great a weight, not only without fatigue, but even without being sensible of exertion.

In addition to this elastic power the air is forced out of the lungs by means of muscles connected with the chest, and as these are employed in speech, it need not excite much surprise that persons should feel fatigue after long-continued exertion of the voice.

The windchest in an organ is a long rectangular box, which is filled with wind by the bellows, and from which the air is distributed into different pipes by the movements of the keys. The windpipe in the human subject serves the purposes of the windchest. It extends from the air-tubes of the lungs upwards to the larynx, and is marked *i* in fig. 16.

It is a well-known fact that the length of an organ-pipe materially influences the sound which it produces; and, in like manner, it is supposed that the windpipe is shortened or lengthened according to the pitch of the notes of the human voice. Whether this be the case or not is a disputed question; but any one, by observing a person when singing, can easily satisfy himself that the motions of the windpipe produce some effect. It will be then seen that it rises upwards during the execution of the higher notes, and descends during the lower ones. As this part,

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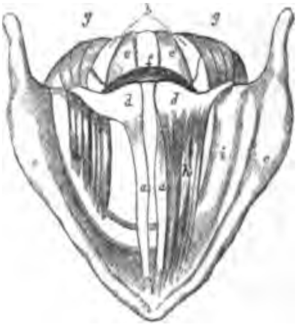
There are two kinds of organ-pipes, the flue-pipes and the reed-pipes, which are made either of metal or of wood, and are placed, some in the interior, some in the exterior of the instrument. A flue pipe has a transverse opening in it, through which the wind passes. The air, as it escapes through this aperture, sets the column of air contained in the tube into vibratory motion. Reed-pipes are usually made of metal; the body of the pipe being either of a conic or cylindrical form, and its mouth-piece has a tongue formed of a thin, elastic piece of metal, that is caused to vibrate by the wind rushing against it as it passes through the pipe. Musical sounds can be produced by the vibration of tongues formed of other substances, such as animal membrane or Indian rubber. This is the case in the human voice, whose sounds can be exactly imitated, so that machines have been constructed that could speak sentences or sing tunes at the will of the musician.

The reed which produces the human voice consists of two tongues which are contained in the larynx. They are placed, with their free edges parallel to each other, leaving a small chink between them, through which the air rushing throws them into vibrations, and from which arise the various sounds heard in speaking and singing. These tongues, marked *a* in fig. 13, are termed the vocal cords, and consist of fibrous tissue covered over by the lining membrane of the windpipe. They are kept in a state of moisture by the fluid formed by numerous minute glands which exist above and around them; and when the secretion of these is stopped by inflammation, as in the case of a common cold, the vibrations of the cords are lessened, and, consequently, huskiness of the voice is produced.

In the organ, different tones are elicited by the air being directed through the pipes by means of the notes and stops; and it will, no doubt, be a matter of surprise to many of my readers how the variety of sounds of which the human voice is capable is effected by one reed alone. In order to explain this it will be necessary to describe the construction of the parts to which the vocal cords are attached.

FIG. 13.

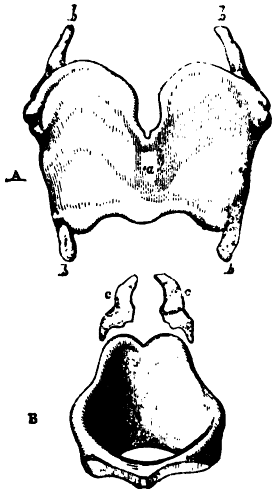


Bird's eye view of the interior of the larynx (after Willis).

a. The vocal cords. The space between *a a* being the natural opening into the larynx. The opening on the left side is formed to show the muscle and cartilage behind. *b* points out the cricoid or ring-like cartilage. *c*. The thyroid or shield-like cartilage. *d*. The arytenoid cartilages. *e*. A ligament that joins together the cricoid and arytenoid cartilages. *f*. The arytenoid muscle that draws together the two cartilages of that name. *g*. The crico-arytenoid muscle. *h*. The thyro-arytenoid muscle of the left side, that on the right being supposed to be dissected away. *i*. The front part of the cricoid cartilage.

The larynx is a box, the several portions of which move readily one upon another; and the cords are, therefore, made more or less tense by the position of the surrounding structures. In order to preserve the vocal cords from injury, and, at the same time, to admit of that ready motion upon which the uses of the organ depend, the firmer parts of the larynx, instead of being of bone, are formed of a tough substance termed cartilage. There are five distinct pieces which are joined one to the other by fibrous tissue and by muscles. The largest of these is called the thyroid, and is seen in fig. 14, marked A, it is so called from its resemblance to a shield, and being

FIG. 14.



Cartilages of the larynx.

A. Thyroid or shield-like cartilage. B. Cricoid or ring-like cartilage. c. The arytenoid cartilages. a points out the central projection of the thyroid cartilage, and b the projecting horns by which it is joined to the cricoid cartilage below and to a bone in the neck above.

placed in front, protects the rest of the larynx from injury. It forms a projection in front of the neck, marked *a*, and is more readily seen in males than females. Behind it has four prominences, marked *b* in fig. 14, of which the two lower ones are connected, by means of joints, with the cartilage to be next described; the upper ones are joined, by a membrane, to a bone situated below the tongue.

The cricoid, or ring-like cartilage, marked B in fig. 14, is in the form of a ring, and supports the thyroid cartilage in the front, whilst behind it is much stronger and thicker and supports the two next cartilages named the arytenoid.

The arytenoid cartilages, marked *c* in fig. 14, are two in number, and placed upon the cricoid, being connected with it by means of joints.

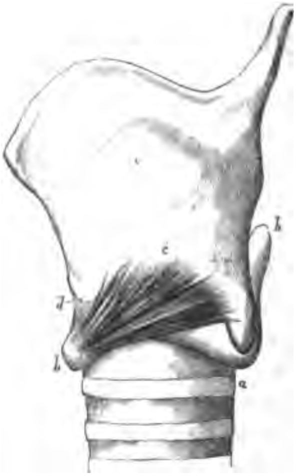
From this description it will be seen that the ring-like cartilage forms the fixed part of the larynx, having the shield-like cartilage above it in front and the two arytenoid cartilages behind, all of which latter ones are moveable; and stretched between them are the vocal cords, marked *a* in fig. 13, p. 114, upon whose vibrations depend the various sounds of the human voice.

It will probably be a matter of surprise to many of my readers that so many varied sounds should be produced by such a simple apparatus, whilst in instruments of human invention, such as the organ and the piano, so many pipes and strings are necessary.

In the larynx, however, simplicity of construction is associated with great delicacy and rapidity of motion. In tuning a violin the musician tightens the strings by means of the screws to which they are fastened, their other ends being fixed. In raising the notes of the human voice the cords are also tightened; but in this case by means of muscular action. I need scarcely mention that muscles are composed of immense numbers of fine threads, which, possessing the power of contraction, shorten themselves, and thus draw together any two points to which they may be attached. In fig. 15 will be seen one of the muscles which chiefly effects the tightening of the vocal cords; it is marked *c'* in fig. 15, and is named the crico-thyroid muscle, being stretched between the fixed cricoid cartilage *b*, and the moveable thyroid or shield-like cartilage which it supports, marked *c* in fig. 15. Now when this muscle contracts it necessarily depresses the moveable cartilage towards the cricoid cartilage, and as the vocal cords are attached to the former they are made more or less tense according to the extent of its motion. Here, then, the crico-thyroid muscle corresponds to the thumb and finger of the musician, and the thyroid cartilage acts as the screw of the violin in tightening the strings which are attached to it.

But as we found that the apparatus connected with the vocal cords was moveable at both ends, instead of having one end fixed as in the violin; so we might suppose that some provision would exist for tightening

FIG. 15.



Lateral view of the exterior of the larynx, after Mr. Willis.

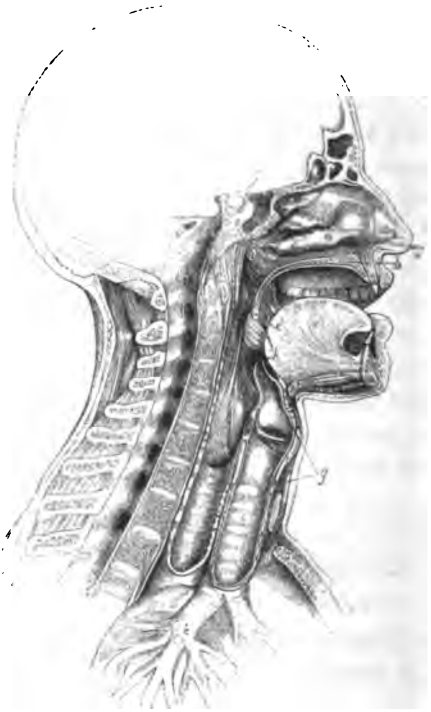
a. Trachea showing also the rings of which it is formed. *b*. The cricoid or ring-like cartilage. *c*. The thyroid cartilage. *d*. A ligament uniting these cartilages. *c'*. The crico-thyroid muscle.

them at the back part as well as at the front. In fig. 13 this is seen to be effected by means of a muscle, marked *g*, arising from the back part of the cricoid cartilage, and attached to the arytenoid cartilages, to which the ends of the vocal cords are also fastened. When this muscle contracts these latter cartilages are drawn backwards towards the cricoid cartilages, and consequently the cords are put upon the stretch.

It is also found that the height of a note is greatly dependent upon the degree to which the vocal cords are approximated. In this case the last-mentioned muscle, the crico-arytenoid, has the power, by separating the cartilages to which it is attached, of also separating the vocal cords; whilst numerous other muscles are able, by their contractions, to draw them closer together, as for instance the arytenoid muscle, marked *f* in fig. 13. It is found by experiment that the edges of the lips of the opening of the larynx, formed by the vocal cords, must be parallel one to the other before a sound can be produced; and this is effected by another muscle which is stretched between the two moveable cartilages, parallel with and adjoining to the vocal cords. It is named the thyro-arytenoid muscle and is marked *h*, fig. 13. For the deepest notes the cords are much relaxed by the action of the muscles which approximate the cartilages. The difference of pitch in the male and female voice depends upon the difference in the length of the vocal cords in the sexes; their relative length in men and women being as three to two. The varieties of tone in the human voice are owing to the nature and form of the resounding walls, which, in the male larynx, are much more extensive and form a more acute angle in the front.

I have hitherto described the vocal organs as forming a musical instrument, I must now draw my reader's attention to the more complicated apparatus employed

Fig 16.



A diagram of the various parts seen when the head and neck are cut in half from above downwards.

a. The bones of the nose. The * points to the duct which conveys the tears into the nose. *b.* The hard palate. *c.* The tube leading from the back of the nostrils to the ear. *d.* The uvula projecting from the soft palate. *e.* The muscles of the tongue. *f.* The gullet. *g.* The larynx; the vocal cords are below the termination of the upper line. *h.* The epiglottis, a cartilage that covers the larynx. *i.* The windpipe; terminating in *k*, the bronchial tubes.

for the purpose of speech. The parts which assist those formerly described, in this important function, are contained within the cavity of the mouth. On opening the mouth it will be observed that its floor (as seen in fig. 16) is formed by the tongue, bounded in front and at the sides by the teeth of the lower jaw. The tongue (marked *e* in fig. 16) consists almost entirely of muscular fibres, and possesses therefore considerable rapidity and range of motion. It is covered by the mucous membrane which lines the mouth, and which is continued backwards into the throat. On either side are the cheeks, which are continuous with the lips, and form the sides of the face. These contain a number of muscles, a quantity of fat, and numerous small glands. Behind, and bounded by the teeth of the upper jaw, is the hard palate (marked *b*, fig. 16) which is formed of bone, and covered by the mucous membrane. Situated behind this is the soft palate, which is a fold of the mucous membrane containing small glands and numerous muscles. Hanging from the middle of its free border is a small rounded process called the uvula (marked *d* in fig. 16), and passing outwards from the uvula or either side are two curved folds of the mucous membrane, called the arches of the palate. Situated between these two arches are the tonsils, which are glandular organs, whose secretion, poured into the mouth by a number of small openings, serves to moisten the adjoining parts.

It is scarcely necessary to remind my readers that the different parts of speech are divided by grammarians into vowels and consonants. Physiologically speaking, the difference between these is, that the vowels are sounds produced in the larynx; the consonants are formed by interruptions in the currents of air in some parts of the passages we have just described. The vowel sounds can be changed into one another by changing the shape of the opening of the mouth, and of the space between the palate and the tongue; so that in pronouncing a vowel, although the sound is generated in the larynx, it is modified by the actions of the muscles of the lips, palate, and tongue. In the production of consonants the whole mechanism of voice and speech is called into action in a variety of ways. If we examine them physiologically we may divide them into groups according to the parts of the vocal apparatus which are chiefly used in producing them. Thus B P V F and M are labials; for instance, in pronouncing B "the lips being closed, the breath held in a state of condensation, and the vocal cords in a vibrating position, the lips are then suddenly opened, and the sound assigned to the letter B, together with the vowel by which it is followed, is heard, as in the words Bat, Tub, &c."*

N ng are nasals, and are produced chiefly by the air passing through the nose.

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* Bishop on the 'Impediments of Speech.'

From the foregoing remarks it will be evident that speech is effected entirely by muscular action; that the walls of the chest are moved by this means as well as the different parts of the mouth, and that to produce the simplest word the simultaneous action of a vast number of muscles in different parts of the body is required. So true, indeed, is this that it has been calculated that a thousand different muscles are set in motion whilst a person is in the act of speaking. Can it then excite surprise that fatigue is experienced after long-continued preaching, or that disease is apt to be generated in some part of the vocal apparatus from injudicious straining of its powers?

The term "clergyman's sore throat" has been applied to a disease usually produced by undue action of the muscles of the throat and windpipe. In reality it is nothing more than long standing inflammation of the mucous membrane, which, as has been before stated, lines the cavity of the mouth, and is continued backwards into the throat and windpipe. It presents varieties in the morbid appearances according to the part of the vocal mechanism which is more particularly affected. In some cases, but little can be seen by examination of the throat; the inflammation being confined to the vicinity of the vocal cords, and a huskiness or loss of voice being the only symptom. Occasionally certain notes are altered in their tone, and can be discovered only when attempting to sing; at other times the voice is reduced to a whisper during the excitement of public speaking, although when commencing, it may have seemed to possess its natural power. In other instances the uvula is enlarged and thickened, and the remaining part of the soft palate is of a bright red colour, and becomes very sore after speaking. This is perhaps the most general form of the complaint, especially amongst clergymen, and is readily explained by the great mobility of this part. Thus, Sir Charles Bell observed in a person who had lost the bones in the upper part of the face, so that he could look down behind the palate, that the soft palate "during speech was in continued motion, and when this person pronounced the explosive letters it rose convex so as to interrupt the ascent of the breath in that direction; and as the lips parted, or the tongue separated from the teeth or hard palate, the soft palate recoiled forcibly."

The tonsils are two small bodies placed on the sides of the opening of the throat into the mouth. In a healthy state they are composed of a vast number of small glands which pour out their secretion so as to lubricate the passages and permit the more ready descent of the food into the gullet. When attacked by acute inflammation they are the seat of the disease known as quinsy; but when the inflammation is slow and long continued they become enlarged and project into the throat. It is this last condition, which is so commonly seen in clergyman's sore throat, and by it alone the voice is often materially altered in its tone.

In addition to the tonsils there are numerous isolated glandular bodies scattered over the whole surface of the mucous membrane that lines the mouth and throat. These are often the seat of a formidable disease which by many is considered as allied to the complaint we have been describing, but which to others appears to depend more upon a scrofulous constitution than upon an undue or improper exercise of the vocal organs. It seems more general in America than in this country, and has of late attracted a large share of the attention of the profession; but that it is not peculiar to public speakers is proved by the fact that out of two hundred cases only one fourth had been in the habit of unduly exercising the voice.

CHAPTER II.

Undoubtedly the chief predisposing causes of this complaint are to be found in natural weakness of the vocal organs, or of the constitution of the person affected by it. When this state of debility exists, an amount of exercise which, under other circumstances, might be easily borne, readily gives rise to disease. It has been frequently asked why the members of the clerical profession should be more subject to this complaint, as they undoubtedly are, than barristers or actors, who frequently have occasion to strain their vocal powers to excess. But it must be remembered, that of these latter classes none can obtain eminence or even exercise their profession without a naturally clear and strong voice; whereas, in the case of clergymen the condition of these organs seems seldom to be considered when the profession is selected. In addition to this, young men of studious and thoughtful habits are those most likely to devote themselves to religious teaching, and this cast of mind is more than any other associated with constitutional debility. The practical conclusion from these facts is, that before choosing the clerical profession a person should be sure that he possesses not only the desire to preach the gospel but also the vocal ability to do so. For this purpose he ought to practise the voice, and assure himself that the organs used in preaching are able to bear the necessary strain. If there be any physical defect he ought not to enter upon the important duties of public teaching; as in all probability his future usefulness will be limited, and disappointment to himself and his friends be the result.

It must not, however, be forgotten that many of our most distinguished orators have originally suffered from weakness of the parts producing speech, but have, by perseverance, entirely conquered it. I need not quote the well-known example of Demosthenes, or remind my reader of the labour that enabled him to overcome his natural defects, and utter those magnificent orations that have conferred immortality on his name. Cicero, also, says of himself: "My body at this time was exceedingly weak and emaciated, my neck long and small, which is a habit thought liable to great risk of life if engaged in any labour or fatigue of the lungs, and it gave the greater alarm to those who had a regard for me that I used to speak without any remission or variation with the utmost stretch of my voice and great agitation of my body; my friends, therefore, and physicians advised me to meddle no more with causes. I resolved to run any hazard rather than quit the hopes of glory, which I proposed to myself from pleading; but when I considered that by managing my voice and changing my way of speaking I might both avoid all danger and speak with more ease, I took a resolution of travelling into Asia, merely for an opportunity of correcting my manner of speaking."

I would, therefore, strongly recommend all who are desirous of entering the ministry to prepare themselves for its public duties by a greater attention than is usual to the proper manner of speaking, and if there be natural defects which they find it impossible to overcome, to seek some other sphere of usefulness.

It will be readily understood that any weakness in the general health will render the vocal organs liable to disease. This is in accordance with what is observed in other parts of the body. Thus a delicate person is unable to exercise his limbs to the same extent as when strong; and if his exertions should be persevered in, dangerous consequences might be the result. In like manner a public speaker when weakened by disease is unable to speak with the same ease and freedom as when in health, and an undue exertion of the throat and palate is exceedingly apt to excite inflammatory action.

One of the most usual predisposing causes, acting in this way upon the vocal organs, is indigestion; and no class of men seems more subject to it than the clergy. This probably arises from their sedentary habits; and their best way of guarding against it is by constant and regular exercise in the open air. By exercise must not be understood travelling from house to house in the streets of a crowded town, but a more healthful employment of the body; and as conscientious feeling generally prevents the use of rural sports, it will be advantageous to obtain an employment for the mind at the same time, as in the study of botany or some part of natural history. Horse-exercise, when possible, is perhaps the most useful means for preventing the dyspepsia arising from sedentary habits.

The graver forms of the disease are not unfrequently associated with a consumptive tendency, and it often happens that the enlargement of the small glands of the throat and palate is a prelude to deposition of tubercular matter in the lungs. In other cases it arises from disease of the kidneys or other important organs, the symptoms of which have been so masked as not to be easily discovered. Whenever, therefore, a public speaker feels himself incapacitated from following his employment by this complaint, I would strongly recommend him not to waste his time with cayenne lozenges or gargles of his own prescribing, but to consult his medical attendant, in order that he may ascertain whether the disorder is merely local or dependent upon some more serious affection.

In the last chapter the vocal organs were compared to the different parts of a church organ. I must now proceed to describe how an improper use of each of the parts assisting in the production of speech may induce the disease in question. It has been too much the custom to consider it as being produced by one cause alone, whereas it may result from the improper use or over-action of any of the parts concerned in speaking.

We found that the chest was similar in its action to the bellows, being expanded by muscular power, and expelling the air partly by its own elasticity and partly by muscles provided for that purpose. It was also shown how great is the weight lifted at each inspiration, and as, during public speaking, the breathing is quickened and the expiratory muscles thrown into unusual action, it will be interesting to inquire in what way an orator may use the chest with the least possible fatigue. In order that my readers may comprehend this, I must draw attention to the accompanying diagrams, which will serve to explain the position in which the ribs have the greatest freedom of motion. It must be remembered that in inspiration the lungs are filled with air in proportion to the power the individual may possess of increasing the capacity of his chest, and anything preventing this, such as a partial immobility of the ribs, must limit the amount of air received into it. Now let us suppose, as in fig. 17, a series of bars, allowing of free rotation upon a perpendicular body (A *a*), and let their free extremities be kept apart so that the bars may be parallel. Let *c* represent the same bars moved into a position slanting upwards. In this

FIG. 17.

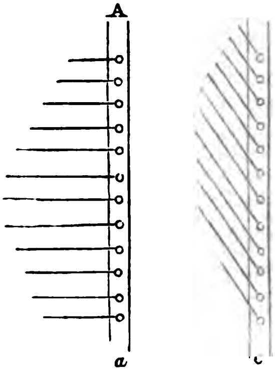
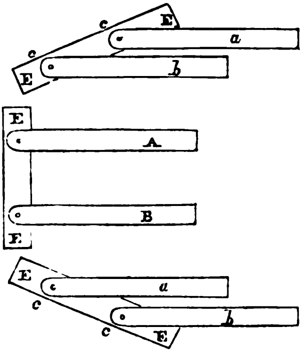


FIG. 18.



state it will be observed that the free extremities of the bars have been brought nearer together, and the distances between them consequently lessened; and if the direction of this motion were continued they would ultimately touch each other. The same effects may be obtained without moving the bars, but by moving the body to which they are attached; thus let A and B in fig. 18 be two bars at their greatest distance whilst horizontal; and *a b* when they have nearly attained their smallest perpendicular distances, though still horizontal, because the rigid bodies to which they are attached have been respectively moved. Now if we join these last three figures into one, as in

FIG. 19.

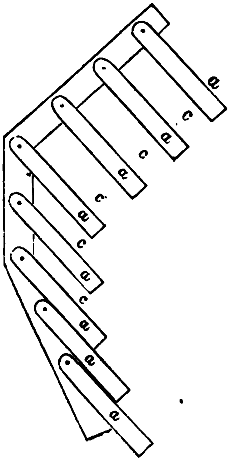


fig. 19, and then move the bars simultaneously, the lower ones will approximate one to another, and consequently the spaces between them marked *c* will disappear.

In the human body, in like manner, the distances to which the ribs move depend upon the condition of the spine; if it is perfectly erect the upper ribs have a greater range of motion from each other, and consequently a greater volume of air can be drawn in. On the other hand, if we curve the spine we limit their divergence, because we then bring them into the position of *a b* in fig. 18. Thus, it has been found by experiment, by Dr. Hutchinson, that the greatest volume of air that a person can inspire, with a spine which has been fixed at an angle by disease, is little more than equal to the volume of air of an ordinary inspiration; *i. e.*, from 20 to 40 cubic inches, instead of from 180 to 200 cubic inches.

If the perfectly erect position of the spine is of so much importance for easy breathing, can it excite surprise that so many cases of throat-disease present themselves among public speakers, when the habit of stooping is so prevalent, both on the platform and in the pulpit.

Nothing is more common than to see a clergyman bending forward over his sermon, with his chest contracted, and his throat bent; or to observe an orator, at a public meeting, with his hand concealed in his waistcoat pocket, and the motions of his chest consequently limited. Now, whatever difference of opinion there may be among speakers as to the elegance of such attitudes, there can be no difference among physiologists as to their preventing the easy play of the ribs, or amongst physicians as to their tending to produce the serious and distressing complaint which I have been describing. I have repeatedly had to treat clergymen for this disease, in whom it was immediately evident, when they were requested to speak as they would in public, that the attitude they then assumed was chiefly the cause of their malady.

In order to show that I am not singular in these opinions, I have appended the following remarks:

"Clergyman's sore throat is due entirely to a neglect of observation of the mechanism of speaking, a mechanism which is obvious to any one whose attention is once directed to the matter. Look at a public singer who wishes to exert the voice to the utmost,—at a Greek or Roman statue of an orator,—at Raphael's St. Paul preaching at Athens,—at most of our really powerful speakers and preachers, and what is the attitude? The lungs are expanded to the full, the windpipe is held straight, the shoulders thrown back, and the arms swing loose; the muscles of the whole trunk have full and easy play, every one of them can be brought to bear in throwing out the voice, because they have nothing else to do; the cartilages of the ribs are stretched so that their elasticity is also made useful, and saves the muscles considerably. Not a single part is overworked, because they all act at once, and assist one another; but make a man with clergyman's sore throat read, and you see the origin of his ailment in a moment. The windpipe is bent at an angle, so as to make it difficult to speak at all; the shoulders are brought forward, so that the poor costal cartilages have no chance of exhibiting the beautiful elasticity they are endowed with; and the lungs emptied, so that the relaxed muscles and the diaphragm have to act at an enormous disadvantage, and to strain themselves in order to squeeze out the squeaking falsetto which results. Naturally enough, all the delicate muscles of the throat are overworked, and affect, secondarily, the mucous membrane that clothes them. There was a quack fellow who made quite a fortune by curing clergymen who had lost their voices. He used to make them promise or swear secrecy concerning his method of treatment, and so it was not generally known that the whole art consisted in teaching them to speak with the chest dilated, and thus to get rid not only of sore throat, but of stammering, and a variety of other impediments arising from feeble muscle.*

As a method of preventing this complaint, therefore, I would advise the constant practice of speaking in an erect position. Where stooping has become habitual, a person is apt to appear stiff and awkward if he attempt to alter his attitude only when in the pulpit, and I have therefore generally recommended such persons to accustom themselves to it, by regularly reading before a looking-glass at home.

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* 'Lectures to Ladies.'

It will be readily understood, that whatever otherwise limits the motions of the chest increases the labour of public speaking, and the clothing should therefore be perfectly easy. I make this remark from observing many clergymen, in the present day, wearing the waistcoat tightly buttoned up to the throat, and so preventing the easy play of the ribs.

Persons subject to this complaint will find it advantageous to increase the muscular power of the chest, by the daily use of the chest-expander, or by the dumb bells; as these means, besides expanding the chest, have a tendency to increase the powers of the muscles of expiration.

It is equally important that the functions of the windpipe should not be interfered with while speaking. A common fault, in this respect, is to bend the head downwards, as in reading from a low desk. The effect of this is, of course, to prevent the free action of this important part of the vocal apparatus.

Every one will probably have observed that animals, while uttering the characteristic sounds of their species, always throw the head upwards, so as to permit the air to traverse the windpipe with greater facility. I would, therefore, strongly recommend all those who do not possess confidence sufficient to enable them to preach extempore, to commit their sermons so far to memory, that they may not be under the necessity of reading them word by word; and where reading is really requisite, that the book should be placed at such a height as to prevent them being obliged to stoop over it. I lately saw a sufferer from this complaint, who wore a tight covering round his throat, under the impression that it would have a beneficial effect upon his disease. Now, although it is necessary, in many cases, to keep this part of the body well protected from cold, anything tight round it, such as a tight neck-cloth, is certain to be injurious, by limiting the proper motions of the windpipe.

We may next consider the causes producing clergyman's sore throat, so far as they act upon the larynx. It is this part which is generally affected in public singers, for I have seldom seen them suffer in precisely the same way as those engaged in preaching or speaking. This difference probably arises partly from the larynx being more especially the musical part of the vocal apparatus, and the sounds being less modified by the throat and mouth while singing than while speaking, and partly, also, because our public singers being regularly trained, hold their throat and chest in a proper position.

When disease affects the larynx, it usually changes the tone or quality of the voice. In some instances we find only certain notes altered, whilst the rest retain their natural power. One of the most common causes of this is from singing whilst the person is suffering from a cold. In this complaint, as every one is aware, the voice often becomes husky; which arises from the inflammation of the mucous membrane of the larynx, preventing the secretion of the glands that lubricate the vocal cords, and so restraining their vibrations when the air is forced through them from the chest. Now, in such a state, if the parts be exerted in singing, the inflammation is increased, the tissues are apt to become thickened, and some of the tones of the voice seriously impaired. It is, therefore, a fair excuse for a lady to decline to sing on account of suffering from a cold, as the exertion is almost sure to do harm. In like manner, public speakers ought to be cautious not to exercise the voice more than is absolutely necessary, when its notes have become husky; and they must not imagine, as many do under such circumstances, that they will be able to 'work it off.'

From what was stated respecting the physiology of the vocal cords, it will be evident that continued speaking in one tone is much more fatiguing than frequent alterations in the pitch of the voice; because by the former, one muscle or set of muscles alone is strained, whilst by the latter, different muscles are brought into action, and thus relieve one another. In the same way, a man raising his arm at right angles to his body, becomes fatigued in five or ten minutes, because only one set of muscles has to bear the weight; but these same muscles can work the whole day, if their action is alternated with that of others. Whenever, therefore, we hear a clergyman droning through the church service, and, in the same manner and tone of voice, reading, praying, and exhorting, we may be perfectly sure that he is giving ten times more labour to his vocal cords than is absolutely necessary.

There is another point of consequence, viz., the unnatural or feigned voice which many clergymen and public speakers employ. Upon this subject, I may quote the opinion of Mr. Macready, the eminent tragedian, who says—"Relaxed throat is usually caused, not so much by exercising the organ, as by the kind of exercise; that is, not so much by long or loud speaking, as by speaking in a feigned voice. I am not sure that I shall be understood in this statement, but there is not one person in, I may say, 10,000, who, in addressing a body of people, does so in his natural voice; and this habit is more especially observable in the pulpit. I believe that relaxation of the throat results from violent efforts in these affected tones, and that severe irritation, and often ulceration, is the consequence. The labour of a whole day's duty in a church is nothing, in point of labour, compared with the performance of one of Shakespeare's leading characters, nor, I should suppose, with any of the very great displays made by our leading states-men in the Houses of Parliament; and I feel very certain that the disorder, which you designate as clergyman's sore throat, is attributable, generally, to the mode of speaking, and not to the length of time or violence of effort that may be employed. I have known several of my former contemporaries on the stage suffer from sore throat, but I do not think, among those eminent in their art, that it could be regarded as a prevalent disease."*

Another common fault, in public speaking, is the neglect of adapting the voice to the size of the building in which the meeting is held. Thus, the speaker either uses unnecessary exertion, or some of the audience are unable to hear him. The best plan is to speak as though addressing some individual at the extremity of the room, and so to regulate the voice that it may be plainly heard without more exertion than is absolutely needful.

It is, perhaps, scarcely necessary to remark, that the duration of the speaking ought to be regulated by the feelings of the individual; and if soreness of the throat, or huskiness of voice, be produced after a speech of a certain length, means should be taken to lessen the amount of labour until the vocal organs acquire greater strength.

Attention was drawn, in the last chapter, to the important part performed by the throat and mouth in speaking; and, wherever a tendency to this complaint exists, great care should be taken that unnecessary labour should not be thrown upon them. One of the ordinary faults of young speakers is that of speaking too quickly. This ought to be carefully avoided, as changes of motion of these parts, when too rapid, are very apt to produce inflammation. "A good speaker should not pronounce more than three syllables in a second, and generally two and a half with the pauses;"* and it will be found serviceable, where there is a tendency to commit this fault, to time the speech by the watch, when practising in private.

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* Dr. Mackness on 'Dysphonia Clericorum.'

Many have a habit of speaking with the mouth almost closed, and so forming the sounds of the consonants chiefly by the palate and throat, which are the parts most susceptible to the complaint. This is of itself sufficient to inflame them if there be any natural weakness; and the sounds which require the action of the lips, mouth, and tongue, should therefore be freely and fully articulated.

All the directions which have been here laid down will, I believe, be ineffectual without regular daily practice of the voice. Nothing seems to have such a tendency to produce this disease as the occasional, prolonged speaking, alternating with long intervals of rest, to which clergymen are more particularly subject. Any one giving the subject a moment's consideration will readily understand this. If a man, or any other animal, be intended for any unusual muscular exertion, he is regularly exercised in it, day by day, and labour is thus rendered easy which otherwise it would be almost impossible to execute. But the generality of the clerical profession undergo a great amount of muscular exertion in the way of speaking only on one day of the week, whilst in the remaining six days they scarcely ever raise their voice above the usual pitch. Were a smith or a carpenter thus occasionally to undergo the fatigue connected with the exercise of his trade, he would not only be quite unfitted for it, but he would lose the skill he had acquired. The example of the most celebrated orators the world has seen proves the advantages of regular and constant practice of speaking; and I would, on this account, most strongly recommend all persons subject to this complaint to read aloud once or twice a day, using the same pitch of voice as in the pulpit, and paying especial attention to the position of the chest and throat, and to clear and proper articulation of the words.

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* Bishop on the 'Impediments of Speech'

Cottage lectures, and other occasional week-day services, may thus be made valuable to the preacher, as well as to the hearer, and improve the vocal powers of the clergyman, while he is influencing the minds and morals of those committed to his care.

PART III.

CATARRH.

CATARRH.

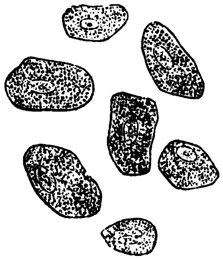
CHAPTER I.

There are few complaints so common, in this climate, as that popularly known as "a cold." Most persons suffer from repeated attacks of it; and on account of its frequency, and not its danger, I am induced to draw attention to the methods of preventing it. In order to understand this complaint, it will be necessary first to examine the healthy condition of the parts which it affects.

Its first symptoms are usually felt in the nose, the lining membrane of which is continuous with that of the throat and windpipe. In fig. 16, p. 120, in which is a representation of the cavity of the nose, it will be seen that this part is hollow, and of an irregular shape. A number of very light bones, marked *a*, fig. 16, are placed in different parts of it. Upon the membrane covering them are distributed the branches of the nerve of smelling, and it will be seen that there is not, as is popularly imagined, an opening between the brain and this part of the face. A very narrow canal, marked by * in fig. 16, leads upwards to the eyes, which conveys the tears downwards; and as it is also lined by a membrane, it is continuous with the lining of the eye above, and with that covering the nose below. The cavity of the nose terminates, behind, by opening into the back of the mouth, as seen in fig. 16, so that the air drawn through it finds a ready passage into the windpipe. From the back of the throat two small passages lead upwards to the ears, marked *c* in fig. 16, which they supply with air; and as they are also lined with the same membrane, it is not surprising that deafness should so frequently arise from affections of the throat.

In the preceding chapters mention has been so often made of mucous membrane that it will be advisable to describe its uses and structure. It is a skin that lines the whole of the hollow parts of the body, defending the more delicate structures beneath it from injury. In its formation it is similar to the outer skin, and like it is composed of layers. The outer layer, or that which is seen on looking into the nose or throat, appears, under the microscope, to consist of very minute particles, termed epithelial cells; and the whole layer formed by these cells is called the epithelium. These cells are continually thrown off and reproduced, and a drop of saliva when magnified appears crowded with them, as seen in fig. 20.

FIG. 20.

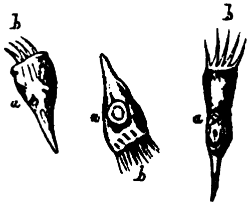


Epithelial cells of the mouth, highly magnified, as seen in the saliva.

The epithelial cells which cover the membrane of the nose, windpipe, and air-passages of the lungs, have a curious provision for the purpose of assisting the passage of the mucus which naturally moistens them. There are small projections, like very minute hairs, attached to the broad end of each epithelial cell, and these are continually in motion, waving backwards and forwards like corn agitated by the wind (see fig, 21). These processes are termed cilia, and are not peculiar to the human subject, but are generally found throughout the animal kingdom, performing in many of the lower tribes a very important office.

Immediately below the epithelium is situated what is called the basement membrane, containing a very plentiful supply of nerves and blood-vessels, by the action of which the epithelium is formed.

FIG. 21.



Epithelial cells taken from the windpipe of a rabbit.

a marks the cells, and *b* points out the cilia projecting from their free extremities.

A common cold, then, consists in inflammation of the membrane we have just described as lining the nose, throat, and windpipe. In its earliest stage the blood-vessels are enlarged and unnaturally distended, and a watery secretion is poured out immediately below the epithelium. From this swelling of the membrane arises the stuffing of the nose and throat, so well known as the first sign of a cold. But in a short time the epithelium gives way, and is washed off by the increased secretion of fluid from the membrane below it. At first this occurs in little patches, but, afterwards, a large portion of the surface is thus deprived of its covering, whence the sensation of soreness that characterises the complaint. When this process takes place in the windpipe, there is, of course, a different set of symptoms produced; the swelling and dryness of the membrane preventing the free vibration of the vocal cords and producing huskiness or partial loss of voice.

Many persons are in the habit of calling every severe cold an influenza; but between these there is a considerable difference. A catarrh is very rarely attended with any dangerous symptom, whilst influenza cuts off large numbers both of the very old and very young; the former complaint seems to depend upon causes capable of being prevented, whilst the latter prevails as an epidemic, affects large numbers of people at a time, and often precedes some more fatal disorder, such as cholera.

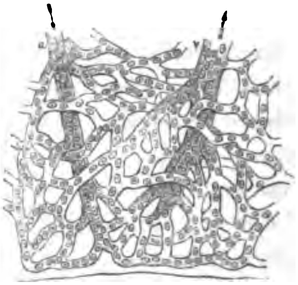
In some persons the throat is always the part attacked, and inflammation is the consequence. If this be confined to the palate, it presents a generally red appearance, from the over-distension of the blood-vessels, which condition is often accompanied by numerous small ulcerations; but if the tonsils become inflamed, matter is generally formed, and this complaint, which is called quinsey, is one of the most distressing accompaniments of catarrh.

CHAPTER II.

Those persons are most liable to colds in whom there is some delicacy of constitution, or whose skin has a languid circulation, shown by habitual coldness of the hands and feet. There are many who seem continually affected by catarrh, each attack rendering them more liable to another.

The usual exciting cause of this complaint is the application of cold to some part of the body. There is often difficulty in persons understanding how a cold draught of air upon the neck or wet feet should produce an affection of the nose and windpipe; but a little acquaintance with physiology is sufficient to explain it. The human body is supplied with blood on a somewhat similar plan to that by which a town is supplied with gas or water, and as in the latter case numerous iron and leaden pipes connected with the reservoir are distributed to various streets and houses, so, in the animal frame, the blood-vessels convey from the heart the blood to every tissue. The vessels of the skin are exceedingly numerous, and, by the colour of their contents, give a rose-coloured tint to the surface of the body. In like manner the mucous membranes are supplied with vessels situated beneath the epithelium. There is this difference, however, between the blood-vessels of the human body and the water-pipes of a town, that, whereas the latter are rigid, the former are able to alter their diameter according to circumstances. Fig. 22 is a representation of the smaller vessels of a frog's foot, as seen under the microscope. When ice, or certain chemical substances which have a similar effect, is applied to such vessels, they immediately shrink and partially or wholly empty themselves of their contents. In the same way, when the hands of a person are exposed to cold the skin becomes pale and shrivelled, from the blood-

FIG. 22.



A view of the circulation of the blood in a frog's foot, as seen under the microscope.

a is placed upon the artery, and the course of the blood is marked by arrows. *v* is the vein that returns the blood, and the network of small vessels between it and the artery is formed by the capillaries.

vessels contracting and forcing out the blood. It is evident, however, that the blood, being thus expelled from the skin, must accumulate elsewhere; and as the mucous membranes are similar in structure their vessels become most generally distended. This overfilling of the blood-vessels is the first stage of inflammation, and, as it was before explained, produces the stuffing of the nose and hoarseness of the voice, which constitute the earlier symptoms of catarrh.

It may be asked how so small a portion of blood as is contained in the skin of the feet should, when expelled from them by the application of wet, give rise to the serious symptoms which we find a cold produce. This is best explained by a reference to some experiments performed by Dr. Edwards. He found that when cold was applied to some portion of the skin of animals, their heat was not only reduced during the time of such application, but that the reduction continued for a considerable period afterwards. In this way when a person susceptible of cold gets his feet wetted, the chill is general; the temperature of the whole body is reduced, and, consequently, the circulation of the blood through the whole of the skin is disturbed.

Any one liable to colds should be careful that the house in which he lives is not damp. I was acquainted with a person who constantly suffered from severe colds when at home, but was free from them when living in any other house. On inquiring into the cause of this, it was found that a cellar beneath the room usually occupied was frequently filled with water, which, no doubt, was the cause of the illness. I have very frequently seen a liability to catarrh in persons inhabiting newly finished houses, the partially dried lime of the walls appearing to produce it.

It is very generally the custom for those susceptible to cold to confine themselves to closely heated rooms, under the impression that, thereby, they prevent all chances of the complaint. Others put on extra clothing for the same purpose, and are constantly complaining that, notwithstanding all their care, they are still attacked.

Nothing is more common than for those who have been some hours in a heated room or public assembly suddenly to expose themselves to the night air, and consequently to suffer from catarrh. Equally injurious is the effect of a heated shop in which ventilation, as is too often the case, has been neglected. I am acquainted with a very intelligent tradesman who was never in good health so long as he used a desk raised considerably above the level of his shop; he was cured by placing ventilators in the roof, and thus allowing the heated air to escape.

The best method of preventing the complaint is to bring the skin into such a state that its vessels may be less susceptible of the influence of cold. Heat relaxes, but cold, when properly used, has a tendency to strengthen the blood-vessels. In order to effect this, cold sponging should be employed every morning, or, if more convenient, a shower bath may be used. It must be remembered, however, that a person commencing this system must do it gradually, and must not expect that a skin relaxed by over-clothing will be able to bear the opposite treatment immediately. An enthusiastic acquaintance of mine, after reading in Franklin's works of his plan of sitting without clothing in the early morning, determined at once to practise the same plan. The first attempt, however, convinced him that it was impossible to carry it out in this climate, for he received a cold which continued for months. A delicate person should at first use the water tepid, sponging limb by limb, and meanwhile keeping the rest of the body covered. It is better to rub the skin with a very rough towel after the sponging. Flannel should be worn next the skin, but the patient should never accustom himself to a greater amount of clothing than the season actually requires. Over-heated rooms and sudden transitions from hot to cold air should be carefully avoided. The chief remedy, however, is exercise in the open air, which should be taken whenever the state of the weather will permit. Where the throat is liable to attacks, it should be kept well covered, and men should allow the hair to grow under the chin. It will also be found very useful to gargle the throat every morning with cold water, vinegar and water, or alum water, according as the medical attendant may suggest.

I must, however, impress upon those liable to catarrh, the necessity for steady perseverance in the plan laid down for preventing it. When the skin or mucous membrane has been weakened by repeated attacks, the slightest cause is apt to reproduce the disorder, and it usually requires many months before these parts so far recover their tone as to enable them to bear the vicissitudes of our ever-changing climate.

PART IV.

CROUP.

CROUP.

CHAPTER I.

The disease we have now to consider is confined almost entirely to children; and from its formidable character, and the rapidity of its progress, has excited great attention among the practitioners of medicine. Like many other complaints that are influenced by atmospheric changes, it has often appeared in the form of an epidemic. During one of these, which occurred in the years 1805, 1806, 1807, and which extended over the greater part of central Europe, the nephew of Napoleon, the Crown Prince of Holland, fell a victim to it. This gave rise to the offer of a prize, on the part of the Emperor, for the best essay on the subject, and much valuable information was consequently collected.

Perhaps there are few complaints which better illustrate the difference between teaching to non-professional persons the methods of *preventing* and of *curing* disease. There are many cases of croup which are so slight that they only require the simplest remedies for their cure; whereas, others are of so formidable a nature that they call for all the resources of medicine. Between these, the difference in the first and most curable stage of real croup is so little marked as to escape the notice of a person unaccustomed to the complaint. When, therefore, works on popular medicine prescribe repeated bleedings and other violent remedies, they recommend what in the former class of cases are not only unnecessary but dangerous; but what, in the latter, could scarcely be omitted without risking the life of the patient. But the rules which can be laid down for preventing an attack, are applicable to all varieties of the complaint; and at the same time are of so simple a nature that any one can understand and employ them.

It will be necessary to remind my readers that the air is conveyed into the lungs through the windpipe (see fig. 16, p. 120) and that at the top of this tube is situated a box called the larynx, which contains the vocal cords (see fig. 13 *a*, p. 114.) Between the two edges of these cords is a narrow opening, rather less than an inch in length, its width being constantly altered during speech by the action of the adjoining muscles. It will be readily understood that if anything should occur permanently to narrow or to close this opening, great distress or death must be the result, as the air is thus prevented entering the lungs. Such is the nature of croup; a thick tenacious matter being secreted, which sticking to the sides of the windpipe and larynx, blocks up the passage which naturally admits the air.

The colour of the membrane lining the larynx and trachea is, during life, of a light red; but when inflamed, as in croup, it becomes of a much deeper colour, and numerous vessels can be seen ramifying upon it. It is also generally swollen, especially about the back part of the tube. When first formed the matter which blocks up the tube, and which is called the false membrane, usually adheres firmly in its situation; but, afterwards, a thinner matter is poured out below it, which separates it from its connections, so that small pieces are frequently coughed up.

From the description of the changes which are produced in the tube leading to the lungs, the symptoms presented by patients suffering from this disease will be easily understood. In the first stage, when the parts about the vocal cords are only thickened and inflamed, there is generally a loud, ringing cough, of a peculiar character. A cough is nothing more than a sudden forcing out of the air from the chest, and, as every one knows, may be produced by any irritation at the back of the throat, where the larynx is situated. How much more, then, is it likely to be brought on when this part is the seat of inflammation.

When describing clergyman's sore throat, it was shown that the voice was occasioned by the air being forced from the lungs through the narrow passage between the vocal cords, but, when these are inflamed, it is evident that they will not vibrate in their natural manner; and hence arises the loud, harsh noise so distinctive of the cough of croup. In the same way we may explain the changes of the voice in this complaint, the child usually speaking in a husky tone, and often in a whisper. As the disease progresses, the symptoms assume a more formidable character; the breathing becomes now more difficult, and the efforts to obtain air more severe; the chest heaving rapidly, and the head and throat thrown back, so as to admit the air as easily as possible through the narrowed opening. This painful struggle arises from the matter which is formed still further blocking up the passage, so that the child is forced to fight for every breath of air that it receives.

One of the chief difficulties in treating this complaint arises from the frequency with which inflammation of the lungs is associated with it, so that one disease assists in keeping up the other. In other cases, the false membrane is formed, not only in the larynx, but likewise in the windpipe, even down to its division into the bronchial tubes, which go into the lungs.

CHAPTER II.

An eminent medical writer has remarked, that if persons were to treat their children with the care and attention which some authors recommend for the prevention of croup, more harm than good, on the whole, would be the result. This idea, however, has arisen from his not remembering that only certain children are peculiarly liable to it, and that there is no occasion for the whole of the juvenile population to be subjected to the restraints of medical rule. It is, therefore, necessary, in the first place, to ascertain the circumstances which predispose to its attacks.

Unquestionably the chief predisposing cause is an hereditary tendency. Nothing is more common than to find each child in a family, as it reaches a certain age, present symptoms, showing its liability to the complaint. Thus, at the present moment, I have three slight cases of croup under my care, and, in each of the families, other children have previously suffered from it. Whenever a child has been once affected, he is liable to a return of the disease. Thus, one boy is mentioned by a medical writer, who had nine times suffered from severe attacks. If, therefore, any member of a family has once been affected, the parents should watch with the most jealous care, not only his health, but that of their other children, and prevent their exposure to circumstances which will be named, as tending to excite the complaint.

Age exercises a great influence in predisposing to it. Thus, it appears from the fifth report of the Registrar-General, that, while 1022 out of 98,391 deaths in the metropolis and twenty-four town districts took place from croup, 1013, or 99·9 per cent. of those deaths occurred before the age of fifteen years, and 879, or 87·9 per cent. before the age of five years. It is stated by authors that the disease usually appears between the years of two and eight, and therefore precautionary measures are only required during this period. I have generally observed that the stronger the hereditary predisposition, the earlier the child is apt to be attacked.

It seldom appears in children who are at the breast; and it is frequently observed that those who have been brought up by hand are more liable to it than others. This is well worthy of remembrance; and I would strongly recommend mothers who are unable to nurse their children, in case other members of the family have suffered from this complaint, to procure the aid of a wet nurse. Boys are more frequently attacked than girls, and the cases are usually much more rapid and fatal. This is very difficult of explanation. Some have supposed that the difference in the size of the larynx between the sexes may account for it; more probably it is occasioned by the circumstance that boys are more exposed to the exciting causes. In the fifth report of the Registrar-General, it is stated that the deaths of males, under fifteen years of age, are to the deaths of females, from all causes, as 11 to 10; but that 15 males for every 10 females die from croup. Of 249 cases of croup in Vienna, 144 occurred in males, and 105 in females; and Jurine states that, between the years 1791 and 1808, 54 males and 37 females died of it at Geneva.

Croup very frequently follows eruptive fevers, such as scarlet fever or measles; and in this case it seems to be produced by the weak state of constitution usually left after the disappearance of these complaints. It is a good plan, where a tendency to croup exists, to send the children, when convalescent, for change of air into some dry and sheltered situation, at a distance from their own homes.

The above are the principal circumstances that render some children more liable than others to this formidable disease. It will, in the next place, be necessary to ascertain those which excite or bring it into action. The chief of these exciting causes is a cold, damp air. From the Registrar-General's reports, it appears that in Kent, Surrey, and Sussex, the deaths from croup are to the deaths from all causes in the proportion of ·9 per cent.; whilst in the four northern counties of Durham, Northumberland, Cumberland, and Westmoreland, which contain an equal population, the deaths from this cause are in the proportion of 1·6 per cent.

In the spring and autumn, when the north-east winds prevail, croup is most apt to occur on the eastern coast of this island, as not only is the wind cold, but also surcharged with moisture from the adjoining sea. In like manner, a cold wind following wet very often gives rise to the complaint. It has been remarked that, even when a house has been situated near a pool or lake, the family has been liable to this complaint; and I am acquainted with one person whose residence is so situated, and whose children were all cut off, in succession, as soon as they reached the age of two years.

If, therefore, the parents of a family in which a predisposition to croup exists, are in circumstances enabling them to choose their place of residence, they should select a house situated in the country, at a distance from the sea-coast, well sheltered from the north and north-east winds, with no body of water very near, and not much surrounded with trees, as these have a tendency to make the situation damp. Poorer persons should seek for houses in dry and well-drained streets, especially those sheltered from the colder winds, and they should avoid cellar dwellings, or cottages with stone floors.

During the spring and autumn, when the winds are in the east or north-east, children subject to this complaint should not be permitted to go into the open air, and at all times attention should be paid not to expose them in foggy weather, especially in the evenings, as croup generally attacks those liable to it during the night. Parents must, however, be careful not to run into an extreme, and weaken their children by constantly keeping them in a warm atmosphere. The rooms should be of a temperate heat, and an excessive quantity of clothes should not be permitted. Sponging with cold water every morning is an excellent practice, and tends greatly to prevent that susceptibility to cold to which children subject to croup are so liable.

It has been stated that insufficient clothing about the neck and throat often gives rise to croup, and this should be carefully guarded against during the colder season of the year.

Indigestion is a very common cause of slight attacks, and vomiting, by bringing up undigested food from the stomach, often gives immediate relief. Great attention should, therefore, be paid to this point, and the directions of the medical attendant should be strictly followed. Taking food shortly before sleep has often appeared to me to act as an exciting cause, and it will be wiser to make the last meal of as light a nature as possible.

PART V.

FALSE CROUP.

FALSE CROUP.

CHAPTER I.

The symptoms of true croup continue until the patient is cured, or until death terminates the scene of suffering; whilst, in the complaint now under consideration, the attacks are only occasional, and the child may, in the intervals, appear perfectly well. In false croup the first thing that attracts attention is a crowing sound attending the drawing in of the breath. This takes place, most frequently, during the night; but as the disease advances any excitement produces it. In the later stages it is often attended with convulsions, and death, not unfrequently, occurs suddenly during one of the fits.

In true croup the symptoms are produced by the tenacious matter formed by the inflammation of the windpipe blocking up the passage to the lungs; but in this complaint there is no alteration in the condition of the larynx when examined after death. The crowing sound and difficulty of breathing appear to arise from spasm of the muscles surrounding the narrow chink situated between the vocal cords, see *a*, fig. 13, p. 114. This spasm of the muscles is connected with some irritability of the system; and the disease ought rather to be classed among those of the brain and nerves than among those connected with the windpipe.

When this complaint has once appeared it is peculiarly liable to return, and for this reason the circumstances tending to produce it and the means of prevention ought to be generally understood. Most of the children attacked by it are of an excitable constitution, having a fair, delicate skin, and thin, silky hair. It also appears more frequently in females than in males.

The age at which this complaint is most liable to occur is fortunately limited from about seven months to two years; the greater number of cases occurring from the tenth to the fourteenth month. During this period, therefore, preventive measures should be employed if there is any reason to believe, from a previous attack, that the child may be subject to it.

When one member of a family has suffered, it is generally a proof that the others will be also liable to the complaint; thus, Dr. Henry Davies mentions the fact that four children in the same family were attacked, of whom three died. Dr. Hall lost three infants in one family from this complaint; and another case is mentioned in which only one in thirteen children of the same family escaped it, and in four of them it proved fatal. We could not have a more striking instance than this of the advantages of teaching the methods of preventing disease to the public at large. Wherever, therefore, one in a family has been attacked, the remaining children must be most carefully watched during the age before mentioned.

One of the chief predisposing causes is teething, the pressure of the tooth against the gum producing an excitability of the general system that renders the child remarkably liable to such a disease. Consequently it is at this period that the greatest caution should be used to prevent any exposure to those circumstances which are most apt to excite the complaint.

False croup is seldom observed in children who have been brought up with the nourishment that nature intended for them, but is almost exclusively confined to those who have been reared by hand.

Almost all medical writers agree that errors in diet are amongst the most general predisposing causes. "Of the numerous instances of this complaint," says a late author, "which have come under my notice at various times, this disease has occurred to two infants only who were not fed by hand, either altogether or partially." * When, therefore, a family is known to be subject to false croup, the child should be kept longer than usual at the breast, or, if the mother is not able to suckle it a wet nurse should be provided; and if this is not practicable the greatest care should be taken of the diet. The food should not be of a stimulating nature, and should never be made too thick, but as near as possible to the same consistence as milk. A bottle ought to be used, as the sucking assists in the digestion of the food.

Residence in a crowded town predisposes very strongly to this disorder, and nothing seems to produce such striking effects in preventing its recurrence as removal to a pure air. In some parts of the country, in fact, it is so rare that practitioners of twenty years' standing have never met with a case.† The following striking instance of the effects produced by change of air is related by Dr. Merriman.

"The infant son of an eminent banker was attacked by laryngismus, and as all the usual remedies failed in subduing the symptoms the child was removed to the country with an immediate good result. A return to town after a short time brought back the paroxysms, which were again checked by country air; and after a *third* unsuccessful trial of a residence in London the child was kept away from it for a considerable period, and then had no recurrence whatever of the complaint." Dr. Marshall Hall states that he has known three fatal cases of this complaint occurring in a family who resided upwards of four miles from a large town; the other infants of the same family were on this account removed from the place, and thus escaped the disease.

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* Dr. Reed on 'Laringismus.'

† Dr. West's 'Lectures on Children.

Children liable to this disease should be carefully kept from newly painted rooms or other places where there are strong. odours. A case is mentioned in which a child was attacked by it whenever brought into an apartment that had been newly painted. In another instance the child of a publican was affected, and as every remedy prescribed proved ineffectual it was removed to the country. After a time, when quite well, it was brought home again, but, on being taken into the bar-room, it was suddenly seized with the complaint, and died in a few seconds.

When a child is affected with false croup care should be taken to avoid the exciting causes of the attacks. Mental excitement is very apt to bring on the spasm, and I have known a child suddenly expire from this cause. Fits of crying frequently prove injurious, and attention should therefore be given to avoid all unnecessary occasions of annoyance or distress.

Although great benefit arises from change of air, exposure to cold should be carefully avoided, as an east or north-east wind in the cold season of the year is apt to bring on the spasm. In other instances it produces catarrh, and thus aggravates the complaint. As the attacks are more frequent at night than in the daytime, it is generally advisable, in the colder seasons of the year, to keep a fire in the bedroom so as to preserve an equable temperature.

PART VI.

BRONCHITIS.

BRONCHITIS.

CHAPTER I.

When the inflammation of the larynx, which produces the symptoms of a common cold, extends downwards so as to affect the bronchi or air tubes of the lungs, it receives the name of bronchitis. It is very necessary that public attention should be directed to this complaint, not only on account of its great frequency, but also because, when it often recurs, it produces other changes in the structure of the lungs tending to destroy life. It may, indeed, be taken as an illustration of the great advantage that would arise if popular books on medicine were written to teach the prevention rather than the cure of diseases. Supposing a person suffering from bronchitis should happen to succeed in curing himself by the directions of a work on domestic medicine, he will be liable to a return of the disorder when he is next exposed to any circumstance tending to produce it. Each fresh attack predisposes to another, and lays the foundation of a serious and perhaps incurable disease. But if, on the other hand, he were instructed as to the nature and means of preventing the complaint, the mucous membrane of the air-passages would in time become strengthened, and he would escape the consequences of this common and often formidable malady.

In order to point out the frequency of bronchitis, I have added the following table from the Registrar-General's report for the year 1846, showing the relative number of deaths in the metropolis from the most important diseases of the lungs.

Hooping-cough	2035
Croup	277
Laryngitis	121
Pleurisy	146
Bronchitis	2431
Pneumonia	3151
Asthma	802
Consumption	6890
Total	15,853

It will be seen by this table that the complaint in question is the most common disease of the lung, with the exception of consumption and pneumonia, and many of the cases of the latter ought to have been classed under the head of bronchitis. Under the age of five years pneumonia and hooping-cough are alone more fatal; and after the age of sixty-five there are more deaths from bronchitis than from all the other causes added together.

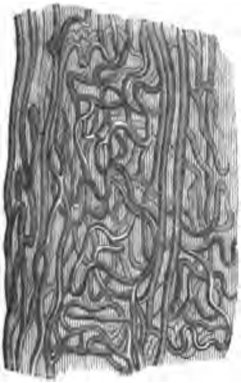
But it is not only from its fatality that it demands attention, but from its laying the foundation for subsequent attacks of asthma, heart disease, and other complaints of a like fatal character. It is one of the most common and distressing complaints of childhood, it affects the artisan in almost every branch of trade, lessening his powers of labour and often embittering his existence; whilst in old age it is of the most frequent occurrence, and very generally terminates fatally.

The windpipe, as will be seen by fig. 5, marked 1 and 8, p. 21, and *i* and *k*, fig. 16, p. 120, divides into two tubes which enter the lungs, and are named the bronchial tubes. As soon as either of these passes into the lung, it also divides into two branches, and each of these again divides until every portion of the organ is supplied with a small pipe to conduct the air to it from the windpipe. All these are also termed bronchial tubes. It is necessary that they should have a considerable degree of firmness, so as to admit the easy passage of the air, at the same time the purpose they serve would not permit them to be formed of rigid material. We find, therefore, that their walls are strengthened by pieces of gristly substance laid across the tube, at intervals, in the form of rings. As they decrease in size the gristle gradually disappears, and at their terminations they are formed entirely of membrane, see *a* and *d*, fig. 6, p. 23. The whole of them are supplied with muscular fibres, which enable them to contract. They are all lined with a mucous membrane, similar in structure to that described in the article on catarrh, and the free surface of this membrane is covered with cilia, see figs. 20 and 21, p. 149, which are in constant motion, and by their vibrations force onwards any fluid the tubes may contain.

Bronchitis, then, consists in inflammation of the bronchial tubes, whose structure we have just been describing; and the symptoms of the complaint chiefly arise from the air not getting free entrance into the lungs. The changes produced by bronchitis vary according to the stage of the disease. In its earlier stages the mucous membrane is usually of a red colour from its containing an unusual quantity of blood. When examined by the microscope the vessels are seen, as in the accompanying figure, to be enlarged and overloaded. The membrane itself is generally thickened, and the epithelium removed, either wholly or in part; the cavity of the tube is also filled with mucus.

The symptoms of the complaint will be readily understood by the above description. The expectoration, which takes place in the earlier stage, consists of the epithelium which has been stripped off by the inflammation. Afterwards, however, it is secreted by the raw surface of the mucous membrane, and in long, standing cases is often as thick as that expectorated in consumption. The loss of the epithelium readily explains the feeling of soreness which the air often occasions when it enters the chest; and as the natural use of the cilia is to move upwards any secretions in the tube, it will be readily understood that the expectoration will be apt to accumulate until expelled by coughing. But if the tubes are thus blocked up, it is plain that the air cannot be so easily forced into them as when they are in their natural condition, and hence the difficulty of breathing so generally observed in this complaint.

FIG. 23.



Magnified view of the mucous membrane of the bronchial tubes, showing the enlargement of the blood-vessels in bronchitis.

When any piece of complicated machinery is injured in any of its parts, the rest are sure to suffer; thus if a strap or a wheel of an engine is broken the motions of the remaining wheels are likewise hindered. In like manner when the structure of any part of the human body is altered changes in other parts are also produced. In this way a slight attack of bronchitis frequently brings on symptoms of the greatest danger, and leads to diseases which it is difficult or impossible to remove.

In childhood the effects of bronchitis differ materially from those observed in later periods of life. The lung is often seen shrunken and deprived of its air, and death consequently ensues. The way in which this takes place is best explained by the following experiment. If a piece of paper be forced into one of the bronchial tubes of a living animal the air-cells below it will be found deprived of their air and squeezed together, whilst other parts of the lung are unnaturally distended. The explanation of this is that the air thus confined in the cells is absorbed by the blood, whilst the plug of paper prevents the entrance of more to supply its place. In like manner it often happens in children that some of the bronchial tubes become obstructed by mucus, and thus a neglected cold suddenly brings on symptoms of the utmost danger.

In older persons, bronchitis often lays the foundation of incurable disease, in a different manner. The powers of breathing being so much stronger than in children, there is but little danger of the tubes becoming so obstructed by the expectoration as to prevent all passage of the air. It often happens, however, that the tube is so narrowed that the air escapes from the cells with great difficulty; they therefore become unnaturally distended, and, by the increase in their size, the blood-vessels around them are pressed upon, and partially obliterated. In this way is produced a disease technically called emphysema, which forms a large proportion of the cases popularly known as asthma.

Occasionally the bronchial tubes themselves become greatly enlarged after an attack of inflammation. Their mucous membrane becomes thickened, and a train of symptoms is induced precisely similar to those of consumption.

Most of the changes in the lung which follow bronchitis are the result of *frequent* attacks of the complaint; and it becomes, therefore, evident that the causes and means of prevention should be known to those subject to it.

CHAPTER II.

It was shown in the last chapter that the effects of bronchitis vary considerably, according to the age of person attacked by it. There are, however, certain circumstances which appear to excite the complaint in any one predisposed to it, such as the exposure of the surface of the body, or of the membrane lining the bronchial tubes, to cold or moisture.

As, in the chapter on Catarrh, I spoke of the manner in which cold water, when applied to the skin, produced the symptoms popularly known as a cold, it will be unnecessary here to repeat the explanation; and it will be easily understood how a very slight wetting may bring on bronchitis, when the tubes have been weakened by a previous attack. This being the case, how important is it to use every precaution, especially against remaining in clothes that are the least damp. Many are very careless on this point, and some are so unwise as to attempt to dry their clothes by standing before the fire after getting wet through, the usual effect of which is to leave them very little dryer than before.

Supposing a person subject to bronchitis has had his clothes wetted, and is prevented by circumstances from changing them, his best plan is to keep up the circulation of the skin by rapid walking, and, if opportunity offers, to take a cup of hot tea or coffee. Ardent spirits, though frequently used in such cases, are of no benefit, as a chilliness usually follows the temporary excitement they produce. As soon as possible, the person who has been thus exposed should change his clothes in a warm room, rubbing the skin well with a coarse towel to promote the circulation, and putting on extra clothing to keep up the heat of the surface.

Persons subject to bronchitis should be careful about the warmth of their feet, as a tendency to this complaint is often accompanied by a languid circulation in the extremities. The stockings should be warm; and, in the case of children, such a caution is particularly necessary, as fashion often insists upon the legs being dangerously exposed. Indian-rubber shoes may be worn during wet weather, but should not be used at other times, as they confine the perspiration, and often occasion dampness of the feet.

It will be readily understood that cold or damp air, when applied to the mucous membrane of the bronchial tubes, will be very apt to excite bronchitis in those subject to it. One of the most common causes of the complaint is the sudden change to cold or night air, after having been for some time in a heated room or public assembly. It is generally found that bronchitis is most frequent during the colder months of the year, and especially during the prevalence of the easterly and north-easterly winds.

In no complaint is change to a warmer climate of more value than in this, as the patient is able to take exercise without risk. Where this cannot be done, or where the attacks are of so slight a nature as not to require the change of air, the use of a respirator in cold or damp weather will be found of the greatest value. In using this instrument, I must remind my readers that no benefit can be expected unless it is employed *with perseverance.* Many make a toy of it, using it sometimes, but neglecting to do so regularly. Now, the principal thing in the prevention of bronchitis is to ward off *every* attack, however slight; for each inflammation of the membrane weakens it, and renders it more liable to a recurrence. A person, therefore, who has had repeated returns of this complaint, from exposure to cold air, ought to carry the respirator always with him, so that, on any occasion when necessary, he may use it at once. A lady, subject to bronchitis, went out in a carriage on a fine spring morning without taking her respirator with her. Within half an hour the wind suddenly changed, and, although she immediately returned home, she was violently attacked by the disorder. The best kind of respirator is the one formed of metal, if intended for use during the colder months of the year; but there is a more portable one, composed of sponge, which will be found very useful in milder weather.

Bronchitis most frequently occurs in early childhood or in old age. Thus, out of 2431 deaths from this disease, registered in the metropolis, 888 were of children under five years of age, and 762 of persons above sixty. These figures express only the deaths, but do not furnish data from which to calculate the actual amount of illness occasioned by the complaint. It will be useful to add a few remarks upon the prevention of bronchitis in early and in advanced life.

In children, it generally occurs during the period of teething, and proves one of the most destructive accompaniments of that trying period. It must ever be borne in mind that, however slight in the first instance the attack may be, the weakness of children, at an early age, renders them liable to the collapse of the air-cells before described. If a child has been affected with the complaint during the cutting of any of the teeth, precautionary measures should be adopted when there is any appearance of another tooth pressing on the gum. These measures should consist in keeping it in a moderately warm room, and, if in the winter, the fire should be kept burning during the night. If in the summer, change of air is advisable; but exposure to cold winds, even then, is to be dreaded. Flannel should be worn next the skin; the diet carefully regulated; no stimulating food allowed; and the medical attendant should be consulted on the first reappearance of the complaint.

There is a caution which should be given to every parent whose children are liable to bronchitis—never to apply leeches without medical sanction. I have repeatedly seen loss of life from this injudicious treatment, quick breathing having been considered a certain evidence of inflammation of the lungs. This is a very erroneous idea; for in any feverish attack, or even from great weakness, the breathing is apt to be quickened, and the abstraction of blood in such cases, by reducing the strength, favours those dangerous changes in the structure of the lungs which were before described.

Bronchitis is so frequent in old age, that few persons reach an advanced period of life without suffering in some degree from it. Some are attacked as soon as the winter commences, whilst in others it causes no more inconvenience than an increased secretion of phlegm. Those who are liable to it, and whose circumstances will allow of their removing to some warm and sheltered place, where they can take exercise without exposure to cold or damp, will derive great advantage from doing so. Where this cannot be effected, the precautions against cold winds, before insisted upon, should be employed. Flannel should be always worn next the skin. The diet should be generous; and malt liquors and other stimulants will be frequently found of great service.

CHAPTER III.

The importance of the subject of the present chapter cannot be too highly estimated. Few persons are aware of the extent to which life is sacrificed by many of the labouring class, in their endeavours to procure the means of subsistence. Public attention has been so often directed to epidemics, that the feeling has become general that *they* are the only sources of preventible disease. Such, however, is not the case. Numerous are the articles of use or luxury which are at present produced at the cost of human life and suffering. The cutlery on our tables, the crockery ware in the kitchens, many of the most useful articles of dress, the needles so indispensable for domestic purposes, and even the stone of which our houses are constructed—all these, and numberless other articles in daily use, are obtained at the expense of the health, and often life, of those employed in their manufacture. Nor does the evil rest with the premature death of the workman. Years of suffering are necessarily associated with poverty, and habits of intemperance are often the result of the depression and misery connected with long-standing disease.

In the trades mentioned in this chapter, the injurious effects arise from the workmen inhaling particles of steel, stone, or other substances, in the working of which they may be employed. It is not difficult to understand how an atmosphere, loaded with particles of steel or stone, should produce disease of the bronchial tubes. The mucous membrane, which is thus liable to irritation, is similar in structure to that which covers the white part of the eye; and we may therefore, by observing the effects of sharp particles upon the latter, be able to understand what must be the consequence of similar injuries inflicted upon the former. When a particle of steel has injured the eye, the blood-vessels become enlarged, and assume the appearance popularly known as bloodshot eye. After a time, the parts in the neighbourhood of the injury become softened, and ulceration takes place. In examining the bodies of those who have fallen victims to bronchitis, arising from inhaling particles of steel or stone, the mucous membrane of the tubes is found thickened and diseased, the tubes themselves often enlarged, and the structure of the lung, in many places, destroyed by inflammation.

In reading the following remarks, it must be remembered that these are only the occupations producing *bronchitis*, and that persons engaged in other trades are liable to be affected with diseases of a different nature. I am chiefly indebted for the facts here brought forward to the valuable treatises of Dr. Calvert Holland and of Mr. Thackrah, to which I would refer such of my readers as are desirous of a more full account of the evils arising from the present method of carrying on our manufactures.

Those engaged in the grinding of steel suffer more than any other class of operatives from the diseases produced by their employment, as the following statements will show:

Scissor-grinders.—213 workmen at this business were examined, and of these there were only 11 who were above fifty years of age, although some of them had not worked continuously at the trade.

In thirteen years 102 scissor-grinders had died in Sheffield, of whom only 5 had passed the age of fifty, and none had died beyond the age of sixty-five years: 86 out of the 102 had died under forty-five years of age. Of 213 living at the time of the inquiry, 145 had suffered, or were at that time affected with, serious illness. In order to show more clearly the awfully destructive effects of the trade, it has been calculated that, if the lives of 1000 scissor-grinders were examined along with an equal number of persons inhabiting the Midland counties of England, it would be found that, whilst 843 of the former would die under forty-five years of age, only 323 of the latter would be cut off at the same period of life; and whilst the whole of the scissor-grinders would have disappeared at the age of sixty-five, there would be 413 of the others left at that period in the enjoyment of life.

Fork-grinders.—This is one of the most destructive trades that it has fallen to the lot of those interested in the working classes to examine. The ages at death of 61 persons who had followed this employment in Sheffield were obtained, and furnished the following appalling results: Of this number, 35 had died under thirty years of age, and 47 under thirty-six years of age. Of the remaining 14, 4 are to be deducted, who, for many years, were withdrawn from the business; and those who survived the longest did not attain the age of forty years.

Needle-grinders.—This trade is chiefly carried on at Hathersage, in Derbyshire, and at Sheffield, and is, perhaps, the most destructive to human life of any of the employments of which the grinding in steel forms the principal part. Dr. Holland remarks—"We had frequently heard of the pernicious tendency of this particular occupation; and though prepared to believe much, from elaborate investigation into similar pursuits, we candidly admit that the physical evils produced by it exceed all that imagination had pictured. We had no conception that men could be found so reckless of consequences as to engage in the trade, when protracted suffering and death were the certain results." Of 23 workmen at this business, the average

age was only twenty-five years, and that at which they commenced the business eighteen. Of those who had died between the years 1822 and 1843, the oldest was only forty-two years; and he had not commenced the employment until he was eighteen years old.

Razor-grinders.—Razor-grinding differs from the trades that have been before mentioned, in requiring more muscular labour, and in having part of the work performed upon a wet stone. Notwithstanding these advantages, however, the employment is exceedingly injurious to health, as will be seen by the following facts: Of 275 persons engaged in this trade, 154 were under thirty-one years of age; and there were only 20 who exceeded the age of forty-five years. Of 182 deaths, although many were otherwise employed for several years, there were only 21 above the age of forty-five.

Penknife-grinders.—The penblade-grinders use both the dry and the wet stone; and although they create less dust than many other trades, their employment is exceedingly injurious. The number of men in this branch was 319, and of these, although many had not been constantly employed in the trade, only 24 were above the age of forty-five. Of these 24, 8 had been only irregularly employed at the work; so that only 16 out of the whole number had passed the age of forty-five. Of 67 who had died since the year 1832, 52 were under forty-two years old; and, deducting those who had not worked regularly at the business, only 10 had passed that time of life. No penblade-grinder had lived beyond the age of sixty years.

Table-knife-grinders, saw-grinders, scythe-grinders, and file-grinders are all more or less subject to bronchitis, arising from their employment, but in a much less degree than those above mentioned, chiefly on account of the wet stone being employed. It might have been supposed that a general notice would have been sufficient for all of the above trades, inasmuch as they all suffer from the operation of the same cause. The subject, however, is so little understood, and has hitherto attracted such slight notice from those who have, in other respects, attempted to improve the physical condition of the labouring classes, that I am anxious to collect such an array of facts as might draw more public attention to the subject. It must be remembered, also, that these are not the only trades that cause suffering, and prove injurious to those employed. *Wherever* small particles of dust or iron are detached in quantities, the persons engaged in the working of such material are subject to the same kind of fatal bronchitis. Thus, in engine-making, those employed in filing and metal-turning suffer from this complaint, although in a much less degree than the Sheffield grinders.

Drawfiling cast-iron is a very injurious occupation. "Scarcely a filer," says Mr. Thackrah, "can be found in health. Few bear the employment, modified as it is by constant change of material, for twenty-five years. Only one instance have I been able to find of a working filer exceeding the age of fifty. In an establishment of one hundred men, five died last year from consumption, a proportion of about twelve times greater than the consumptive mortality of the English in general."

It is important that the first symptoms of this complaint should be known to those thus exposed to the circumstances likely to produce it; as many recklessly continue their employment for years after this dangerous disease has been established. There is, usually, a tightness of the chest, experienced chiefly in the mornings. Difficulty of breathing gradually comes on; at first so slight as scarcely to attract notice, but afterwards severely felt on the least exertion. Cough occurring in the morning, with slight expectoration, is also among the earliest symptoms of the complaint.

Workers in stone, such as masons, suffer very severely from bronchitis, arising from the dust produced by their employment. The effects vary, however, in different parts of the country, some kinds of stone giving rise to more dust than others; thus Dr. Alison says, "I have reason to believe that there is hardly an instance of a mason, regularly employed in hewing stones, in Edinburgh, living free from consumptive symptoms till fifty." It is still worse in some parts of France. In Saint-Roche the greater part of the workmen are attacked with disease of the lungs before they are forty years of age; and very few indeed escape consumption and live the ordinary term of life. I have remarked that the effects of stone-dressing in this country appear to be chiefly modified by the hardness of the stone, and by the size of the sheds in which the employment is carried on. Wherever many men work together and there is but little ventilation, there the most injurious effects will be found. In Cornwall, according to Dr. Forbes, an immense proportion of the miners is destroyed by bronchitis, one of the principal causes of which he considers to be the inhalation of dust. In Yorkshire the colliers are subject to the same complaint; but such is not the case in Northumberland and Durham, where the mines are much damper, and where but little dust is produced in working them.

Potters.—Potters suffer very severely from the nature of their employment, the dust rendering them especially liable to bronchitis. They are, generally speaking, a very short-lived class of workmen, and are almost always cut off by disease of the lungs.

Workers in flax have a very unhealthy trade; all the departments in the flax-mills, with the exception of spinning and reeling, producing dust. The process of heckling flax is most injurious; very few persons can bear it for thirty years, and in no instance could an individual be found who had been forty years either in this or any other of the dusty rooms. In an establishment containing 1079 operatives, a considerable portion of which was adults, only 22 persons had attained the age of forty, and only 9 had reached the age of fifty.

The yellow-leather-dressers of Worcester are much affected with bronchitis; and in them, as in all others who work in the midst of dust of a light material, difficulty of breathing is the first symptom, and usually precedes the cough and pain in the chest for a considerable period.

Corn-millers suffer considerably, but not to the same extent as those engaged in other dusty trades. Mr. Thackrah mentions that he had found several who had borne the employment from boyhood till the age of fifty or sixty; but he could not find an instance of a healthy miller.

Maltsters, rag-sorters, paper-makers, flock-dressers, feather-dressers, shoddy-grinders, weavers of coverlets, preparers of hair, dressers of hemp, and trades of a similar nature, are all found to be more or less liable to this form of bronchitis.

Persons exposed to gases, such as workers in alkali-manufactories and in the foul air of coal-pits, are also often affected with this complaint; but the symptoms are of a different nature, and it does not generally prove fatal.

I regret that in these latter trades I have been unable to obtain any figures to prove the accuracy of the assertions, because there is a general unwillingness among workmen to admit the unhealthiness of their respective employments. There is also a dislike to make any change in their accustomed plans, or to adopt any precautions against the diseases to which they are liable. Thus, although it is stated that in 1822, out of 2500 grinders, there were not 35 who had arrived at the age of fifty; and out of more than 80 adult fork-grinders there was not a single individual thirty-six years of age; we find that an author, twenty years afterwards, states that no precautions against disease had been adopted. It should be remembered that it is not life only that is thus sacrificed, but that the happiness and comfort of numbers dependent upon those engaged in these trades are likewise at stake.

The history of 9 persons who died from grinders' bronchitis showed the following melancholy results:

Months of Illness.	Family.
7	Wife and 6 children.
36	„ 2 „
9	„ 7 „
18	„ 4 „
24	„ 4 „
1¼	„ 3 „
7	„ 4 „
16	An orphan.
14	Two orphans.

But the health of the workman also much concerns the master-manufacturer. Where the labour is paid for by the day, it is manifestly a matter of pecuniary interest to him that each individual should retain his full amount of physical strength. And viewing this matter upon higher grounds, we may ask whether any one has a right to enrich himself at the expense of others; and is it not reasonable to expect that every manufacturer should be responsible that the lives of those employed in his service shall not be sacrificed by the neglect of any precautions, the use of which it is in his power to enforce. The different plans which have been proposed for the prevention of bronchitis are generally of a simple and inexpensive character; and if they are not as perfect as might be wished, there is no doubt that further improvements could easily be made.

The most essential matter to be attended to, as a means of prevention, is the supply of a sufficient quantity of air. I have seen trades made unhealthy entirely by the number of persons working together in a confined space, where, if larger rooms had been allotted to the workmen, the dust would have been less seriously felt. *This* is often the fault in potteries; and an intelligent workman informed me that he suffered much less when working abroad than in England, because the manufactories were so much larger that the dust was dissipated. In the case of stone-masons, the injurious effects seem generally increased by the smallness of the sheds under which they work.

Another disadvantage to which the labouring classes are subjected is, that most of the manufactories are situated in the midst of densely populated towns. This is injurious, not only from the currents of air being obstructed by the neighbouring houses, but also from the higher price of ground in the town limiting the extent of the buildings. "The injurious effect," says Dr. Holland, "of dry grinding, and the evils it produces, are comparatively of modern origin. Previous to the employment of steam as a propulsive power, all grinding wheels were situated on the rivers in the neighbourhood, at a distance varying from two to five miles, and in the midst of scenery exquisitely picturesque and beautiful. The consequence was, that whether the grinder was resident in the country or the town, he had the advantage of plenty of fresh air and daily exercise. The modern grinding manufactories are built in the town, and are several stories high, and no regard whatever has been paid to their ventilation. Each room is occupied by eight or ten individuals, belonging to different branches. In former times the houses were well ventilated by dilapidated roofs, shattered doors, and broken windows; but, in the recent structures, these natural means are carefully guarded against, so that the clouds of dust which rise from the stone envelope the grinder, and continue to play round his head."

The first result of the efforts which have been made for the prevention of evils arising from the grinding of metals was the invention of the magnetic guard, or mouth-piece; by means of which it was supposed that the various particles of metal would be attracted, and thus prevented from entering the lungs of the workmen. However, it has never been generally adopted, although the trials of it seemed satisfactory. It is probable that it would prove more useful to turners and filers of steel and iron than to the grinders for whom it was originally intended; inasmuch as in the latter trade the particles of stone, which are mixed with those of steel, would still be inspired.

The following plan is said to have proved a complete preventive of the evils arising from dry grinding. "A wooden funnel, from ten to twelve inches square, is placed a little above the surface of the revolving stone, on the side the furthest from the grinder, and this funnel terminates in a channel immediately under the surface of the floor; *or we may consider the channel simply as the continuation of the funnel*, in order to avoid any confusion in the explanation. The channel varies in length, according to the situation of the grinder, in reference to the point where it is most convenient to get rid of the dust. If we suppose that eight or ten grinders work in the same room, each has his own funnel and channel, *they all terminate in one common channel, the capacity of which is perhaps twice or three times as great as each of the subordinate or branch channels.* The point where they terminate is always close to an external w At this point, within the general channel, a fa placed somewhat in form like that used in winnow corn, and to this is attached a strap, which pas upwards and over a pulley, so that whatever puts t pulley in motion causes the fan also to revolve. Th pulley is placed in connection with the machin which turns the stone, so that whenever the grind adjusts the machinery to work, he necessarily sets t pulley and the fan in motion. The fan, acting this point, whatever may be the length of any of th subordinate channels, causes a strong current to flo from the mouth of each funnel, which carries along with it all the gritty and metallic particles evolved, leaving the room in which the operations are pursued free from any perceptible dust. When the whole apparatus is perfect and in excellent condition, the atmosphere of the place is almost as healthy as that of a drawing-room.

"In one manufactory, where the apparatus is kept in beautiful order, the dust is thoroughly removed, and, in this case, it is conveyed by the general channel into a trough of water on the outside of the building. The quantity which accumulates in it in a few weeks is very great, and in raising it in a mass it seems to have almost the specific gravity of metal. The expense in the construction of the apparatus would scarcely exceed the proportion of a sovereign to each grinder. The funnel will cost only a few shillings, and the channel of the grinder working on the ground-floor may be formed by the excavation of the earth, placing bricks over it, or it may be formed entirely of bricks. The fan and the pulley may be purchased for a mere trifle.

"It is much better that the subordinate or branch channels should be under the floor; if above, which they sometimes are, and in that case made of wood, they are constantly liable to accidents. They are kicked by the foot, broken by the stones, or otherwise injured. Where they are so exposed, the object contemplated in the construction of them is in a great measure defeated; the dust escapes into the room and renders the atmosphere exceedingly impure.

"The efficacy of the plan is unquestionable. Where the apparatus has been in operation for years we have not found a single individual labouring under any pulmonary affection; and the branch in which we have observed this immunity would otherwise have been exceedingly destructive to life.

"A few of the more intelligent grinders have put up, at their own expense, an imperfect apparatus of this kind, and they have described to us in warm terms the benefit derived. In some instances it has been done when the lungs had become affected with disease; and we know, from personal inquiry, that this has not only been arrested, but substantial relief has been afforded to the artisan."

I have learnt from inquiries made in Sheffield that the plan, thus described by Dr. Holland, is now universally adopted in that town. The apparatus is usually made by the workmen, and costs about thirty shillings when put up by a joiner. It has likewise been introduced into the needle-grinding districts; and the improvement in the health and morals of those who use it is stated to be most striking.

The following plan has been suggested for carrying off the dust in the flax-mills; and is applicable to most of the factories in which the materials are of a similar nature:

"Let channels, about a foot in breadth, be made in the floors, each with one end opening into the rooms, and the other end outside the building; over the former let a broad, light wheel be attached to the machinery, and be made to revolve rapidly. A current of air will thus be produced, and this, entering the channel, will draw down the greater part of the dust and carry it out of the building."

The following plan has been employed, in certain parts of Yorkshire, amongst those engaged in the sorting and tearing up of rags: "A large box communicates at one end with the machine used for tearing up the rags, and at the other end by means of a wooden chimney which traverses the roof. The dust is driven by a strong current from the machine into the box, where the heavier and valuable part subsides, and the lighter passes through the chimney out of the building."

As far as I have had an opportunity of observing the above contrivances are but seldom employed. I would, therefore, strongly urge their more general adoption, as a matter of importance both to the workman and master. In some trades I have seen great benefit from the wearing of a light respirator, and, in some cases, the hair upon the upper lip appears to be useful; but neither of these is so effectual as the removal of the dust by the machines I have before mentioned.

PART VI.

ASTHMA.

ASTHMA.

CHAPTER I.

THE term asthma is usually applied to any case in which the patient suffers from severe or long-continued difficulty of breathing; but, as this symptom may arise from any disease of the heart or lungs, the word, in scientific language, has a much more restricted signification. A person is said to have asthma who is subject to sudden and severe attacks of difficulty of breathing, which, after a short time, disappear, and, in the intervals, leave him in the enjoyment of health. The cases which are popularly known as asthma consist, for the most part, of bronchitis, or of dilatations of the air-cells of the lungs.

Asthma, or, as it is often named in professional writings, spasmodic asthma, arises from violent action of the muscles surrounding the bronchial tubes. The existence of muscles in this situation was long doubted by physiologists; but experiments upon animals have satisfactorily proved their presence. It will be easy to understand that if the diameter of the tubes leading into the lungs is suddenly diminished by the contraction of the muscles surrounding them, intense difficulty of breathing and a feeling of suffocation must be the result. Consequently, during an attack of asthma, we find the unhappy sufferer labouring for breath; fixing his hands upon any object near him, so as to enable him to expand his chest to the uttermost; or often lying with his head out of a window to catch every breath of cool air.

Although it is seldom that death occurs during one of these paroxysms, yet, from their frequent recurrence, existence becomes a burden, and the patient is deprived of the most ordinary pleasures of life, as the slightest exposure to cold or other trifling cause appears sufficient to bring on an attack.

One of the chief causes of this complaint is an hereditary predisposition. Thus, in one case, it is recorded that a father, two brothers, a sister, and a sister's daughter, all laboured under it.

Asthma very frequently commences after measles, or some of the other complaints attended with eruption of the skin, or after hooping-cough. When speaking of consumption, I pointed out the ill effects of dismissing the medical attendant before the person who had been suffering from such complaint was perfectly restored to health;* I would here repeat the caution, for I have frequently known cases of asthma arise from neglected cough after measles. When there is an hereditary predisposition to asthma, or indeed to any disease of the lungs, still greater caution should be used, and the attendance of the medical practitioner should be continued till every symptom of the complaint has disappeared.

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* See page 58.

Gout is a very common cause of asthma, and I have often known the affection of the chest precede a very severe attack in the joints. More generally, however, it is observed in females, in whose family the males are subject to gout; and, in such cases, the most careful regulation of the diet is necessary.

Asthma is not unfrequently associated with skin complaints, and makes its appearance whenever the eruption subsides.

In nine cases out of ten, an attack of asthma is excited by catarrh or bronchitis; and the immediate causes producing these affections are necessarily similar. In order, therefore, to avoid such attacks, the rules laid down for the prevention of catarrh and bronchitis must be strictly followed out.* The chief of these are, the use of cold bathing, or, in more delicate subjects, sponging with cold water, and the wearing of flannel next the skin. The patient must carefully avoid damp houses and easterly winds; and the respirator must be *constantly* worn whenever the state of the atmosphere requires it.

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* See page 157, 190.

Asthma is one of the diseases in which the effects of change of climate are most conspicuous. A person who can breathe with comfort in one town often finds himself severely attacked in another; although they may be at no great distance from each other, and no difference in the climate or locality can be discovered. "One patient," says Dr. Forbes, "is better in the country, another in the city; one in an elevated situation, another in a low one. Floyer continued free from his asthma while at Oxford, but never failed to have an attack upon returning to his native air in Staffordshire. An asthmatic lady, mentioned by the same author, was always immediately attacked with difficulty of breathing upon going to Epsom from London, which went off on her return. Dr. Bree was invariably attacked upon visiting Warwickshire from his residence, forty miles distant, and only 200 feet nearer the levol of the sea. A gentleman, mentioned by Dr. Bree, could never sleep in the town of Kilkenny, in Ireland, without being attacked by asthma; and Lord Ormond could never sleep out of the same place without suffering. In the same way, the sister of an asthmatic patient of ours, who had long suffered from this disease in Sussex, was completely cured by going to reside in London, and remained well for a period of ten years, which intervened between her removal and death."

An attack of asthma is generally preceded, for a few hours, by symptoms giving warning of its approach. These consist in a general feeling of lassitude, with pains about the back and limbs. At another time, tightness across the chest, or discharge from the nose, indicates the threatened attack. Whenever the premonitory symptoms are felt, the patient should attempt to ward off the illness; and the most successful method for this purpose is that generally employed by persons subject to catarrh; namely, the vapour-bath, or hot foot-bath, followed by hot gruel or tea, so as to excite perspiration. These measures ought to be followed by a dose of aperient medicine.

When the difficulty of breathing is just commencing, these remedies must not be employed, but the following plan will be found more useful: Place paper, previously soaked in a strong solution of saltpetre, in a dust-pan in the middle of the room; let it be ignited, and as the smoke rises from it the breathing often becomes greatly relieved. Hot coffee is a most valuable remedy, but it must be made very strong to have any effect. A large mustard blister over the chest also frequently gives great relief. Smoking, either of tobacco or stramonium, has long been a popular remedy; but it seldom has much effect unless expectoration is promoted by its means. The leaf of the stramonium is the part selected for smoking, and from ten grains to thirty is the dose. It has been recommended to smoke it, mixed with an equal quantity of sage leaves, in a roll of paper. The most convenient plan, however, is to smoke the stramonium cigars, which are prepared by some chemists. Stramonium ought not to be used without medical sanction.

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